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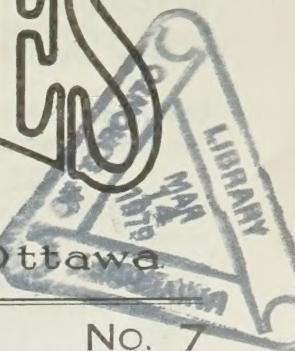


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NATURAL RESOURCES CANADA

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VOL. 6

JULY, 1927

NO. 7

CANADA IS CHIEF SOURCE WORLD'S NICKEL SUPPLY*

MINES ARE NEAR SUDBURY, ONTARIO

Nearly 90 Per Cent of Total Requirements Supplied by Dominion—Importance of Industry

Within the last forty years Canada has become the dominant source of supply in the nickel industry and now furnishes between 85 and 90 per cent of the world's requirements of that metal from mines in the vicinity of Sudbury, Ontario. Canadian production is, practically speaking, entirely in the hands of two large corporations, the International Nickel Company with headquarters in the United States and the Mond Nickel Company, a British concern. Both companies mine their ore and smelt it to a matte in the Sudbury district, but refining of the matte is done elsewhere.

A large part of the matte from the International Nickel Company's smelter is sent to the company's refinery at Port Colborne, Ontario, for the production of metallic nickel (including electrolytic nickel of great purity) and nickel oxide. Blister copper, electrolytic copper, and considerable amounts of the precious metals, gold, silver, platinum, palladium, etc., are recovered as by-products. Some of the International Company's matte, however, is sent to Huntington, West Virginia, for the direct production of monel metal, a "natural" nickel-copper alloy for which there is a large and increasing industrial demand.

All the Mond Nickel Company's matte is sent to Wales for treatment and the extraction of a line of products very similar to those obtained by the International Company at Port Colborne. Much of the copper in the Mond Company's matte, however, is recovered as copper sulphate, which finds a profitable market among European vine-growers. The Mond Company also has a plant in the United States, at Clearfield, Pennsylvania, for the production of copper-nickel alloys (Mond alloys) very similar to monel metal, but made by combining pure nickel and copper in definite proportions instead of by direct treatment from a mixed matte as in the manufacture of monel metal.

*Prepared at the direction of Dr. Charles Camsell, Deputy Minister, Department of Mines, by Mr. A. H. A. Robinson, Mines Branch.

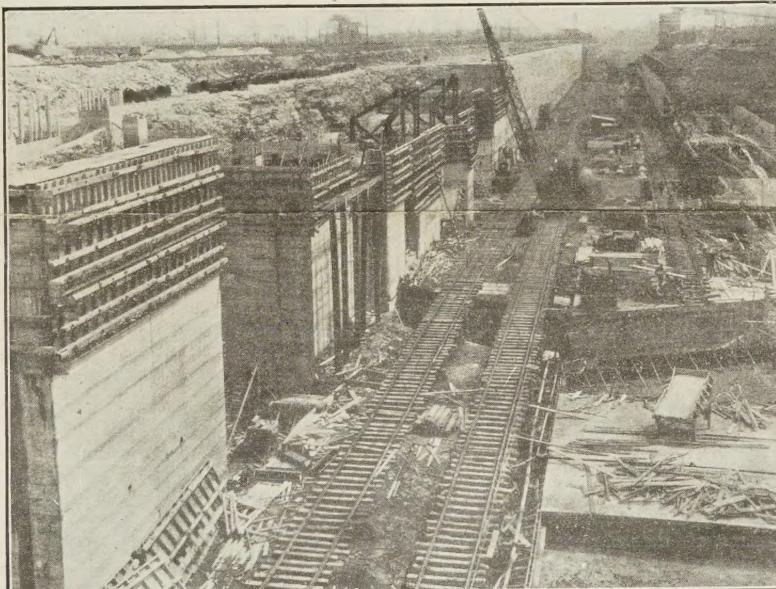
(Continued on page 3)

THE NEW WELLAND SHIP CANAL*

Important Link in Great Lakes-St. Lawrence Waterway
—Notable Engineering Work Nears Completion

In Canada, with her wide expanse of territory, the problem of transportation is a vital one. The economic growth of the Dominion is inseparably linked up with the development of lines of communication. This was early realized in Canada and one of the first important expenditures on public works was made for canals.

cent years. The waterway under construction is the fourth since the beginning of the first canal in 1824. This first Welland canal was projected and built by a private company incorporated for that purpose. Communication was first established between the two lakes by means of a canal from lake Ontario to the Welland river at Port Robinson,



The New Welland Ship Canal—A recent photograph of Lock No. 8 or the Guard Lock near Port Colborne at the Lake Erie terminus of the canal. The contract for this section of the canal was the last one let and the stage of progress attained at this point shows that this great engineering work is rapidly nearing completion.

The Great Lakes and the St. Lawrence river form a system of waterways which extend inland to the heart of the continent. Canals have played an important part in overcoming the many obstacles which occur along this great water highway. In the route from Montreal at the head of ocean navigation to Fort William and Port Arthur, a distance of 1,214 miles, there are 74 miles of canals, with 49 locks and 1,140 miles of river and lake waters. One of the most important units in this system is the Welland canal constructed across the Niagara peninsula between lake Ontario and lake Erie and which overcomes the obstruction to navigation along the Niagara river caused by the famous falls of the same name.

The work now nearing completion on the Welland Ship Canal is one of the most important and notable engineering works undertaken in Canada in re-

thence to the Niagara river and by means of the latter to lake Erie. The canal proper was afterwards continued from Port Robinson to Port Colborne on lake Erie and completed in 1833. The original canal was twenty-seven and a half miles long, and it required forty wooden locks to overcome the barrier interposed by the Niagara escarpment. These locks were each 110 feet long, 22 feet wide, with 8 feet of water on the sills.

After nearly ten years of service this canal was taken over by the Government of Upper Canada in 1841 and rebuilt on practically the same location from Port Dalhousie to its junction with the feeder canal south of Welland. The locks, however, were built of masonry and the number was reduced from 40 to 27. Their dimensions were also altered, the new locks being 150 feet long, 26½ feet wide, with 9 feet of water on the sills. Shortly after its completion the depth was increased to

CONSERVING WILD LIFE IN CANADA'S NORTHERN AREAS

ADDITIONAL MOVEMENT TO WOOD BUFFALO PARK

Game Preserves to Protect Food Supply of Natives—Reindeer Investigation

Much is being done by the Department of the Interior to organize and explore the vast territories lying to the north of the Prairie Provinces. It is fully realized that development of the natural resources will depend on a robust native population and an abundance of wild life. In conformity with this realization game preserves have been set aside for the sole use of the natives; expert investigators have been detailed to examine and report on wild life conditions; experiments have been conducted with a view to the introduction of new species of animal life; and regulations have been enforced with regard to the destruction of predatory animals. One of the most important experiments has been concerned with the transferring, to the Wood Buffalo Park at Fort Smith, of a large number of buffalo which were surplus to the Wainwright Park, Alberta. The experiment has been watched carefully for three years and it is now known to have proved a great success.

To the end of 1926 nearly 4,000 buffalo were transferred from Wainwright National Park, Wainwright, Alberta, bringing the herd at Wood Buffalo Park up to over 5,000 animals. The movement for the present year started on June 9 when 150 yearlings, 72 two-year-olds, and 20 three-year-olds arrived at Waterways, Alberta. Shipments will be made regularly till this year's quota of about 2,000 animals is complete. Park wardens' reports repeatedly state that the animals in the Wood Buffalo Park are very well conditioned and this is verified by other officers who have seen herds when travelling through the district.

As time progresses conditions existing in the District of Mackenzie are becoming better known but to date, although the Wood Buffalo Park covers an area of 17,300 square miles and rich meadows and protecting woods wherein the buffalo can thrive are known to exist, the extent of these and the number of buffalo which can be economically supported have not been ascertained. The area has never been mapped nor has a single mile of survey been run for this purpose. During the last session of Parliament money was voted for the purpose of undertaking an aerial sur-

(Continued on page 4)

*Prepared from material supplied by the Department of Railways and Canals, Ottawa.

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DEVELOPMENT OF POWER AND GROWTH OF TOWNS

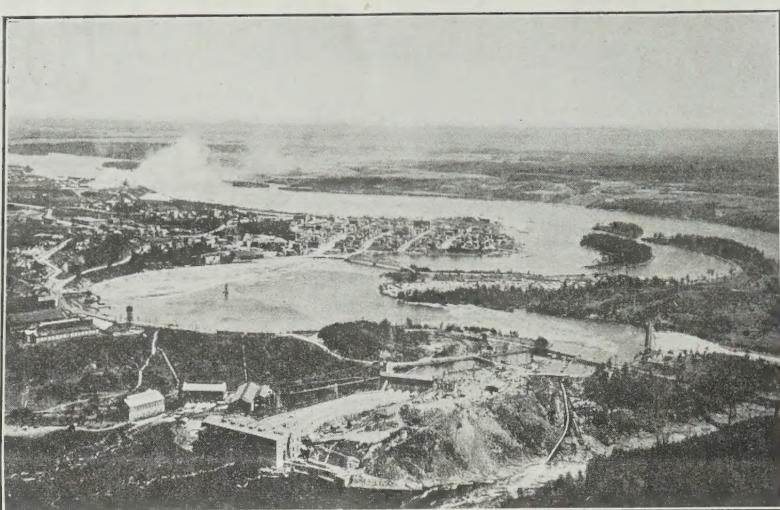
Industry and Population Follow Water Power Development in Canada

Water-power is one of Canada's greatest natural resources and is available in large quantities near practically all the centres of industry from coast to coast. It is now established from the experience of many years that wherever water-power is developed industry and population inevitably follow. Furthermore the modern tendency is for the large industries to locate at the power site, because the cost of power is lower, the land for factory sites is cheaper, the cost of living for employees, taxes, and other items are lessened and thereby the general costs of production are reduced.

New towns spring up wherever large water-powers are developed and older towns take on new life and growth—for instance the towns of Three Rivers, Sorel, Grand'Mere, Shawinigan Falls, Donnacona, and Cap de la Madeleine, Quebec, in the area supplied from the power development on the St. Maurice river; in the Eastern Townships of Quebec where power development over an area of 6,000 square miles has resulted in the locating there of 27 new industries, representing over \$20,000,000 in factory equipment, and the employment of 6,000 persons; on the Saguenay river, 200 miles north of Quebec, the development of 360,000 horse-power has led to the establishment of the new model town of Arvida which is expected to shortly have a population of 5,000; at Outarde Falls, the development of a site with an ultimate capacity of 50,000 horse-power is taking place and the new model town of Outarde Falls is already far advanced with hospitals, schools, convent and town hall. Other towns that have been created by water-power in conjunction with pulp resources are Chicoutimi, Bromptonville, La Tuque, Windsor Mills, Kenogami and Clark City.

In the province of Ontario, in addition to the vast industry and employment resulting from power development at Niagara, Nipigon and other sites, the whole mining industry of the province is carried on with the aid of water-power, without which the large production of gold, silver, nickel and copper would be impossible. Water-power in conjunction with forests has not only made possible a large pulp and paper industry, but is responsible for the creation of new communities such as Iroquois Falls, Kapuskasing, Smooth Rock Falls, Espanola, Dryden and Sturgeon Falls and has also added largely to the industrial welfare of many other Ontario cities and towns.

In Manitoba, Winnipeg and district owes much of its healthy expansion to the low-cost power provided by the Winnipeg river, upon which a new community is growing up around the recently completed pulp and paper mills at Fort Alexander. In British Columbia, where water-power makes a heavy contribution to the prosperity of the coast and inland cities, new towns have been created by the pulp and paper industries at Powell River and Ocean Falls; whereas on the Atlantic coast a new community in Nova Scotia has come into being in connection with a pulp and paper enterprise at Sheet Harbour, and the development at Grand Falls on the St. John river in New



Development of Power and Growth of Towns—View of the town of Shawinigan Falls, Quebec, showing in the foreground the hydro-electric developments on the St. Maurice river at this point with a capacity of 191,500 horse-power.

Brunswick will have a beneficial effect on the centres of population in that part of the latter province.

It is surprising how quickly the population of such a new centre grows and takes upon itself the functions of modern city life. In the beginning, there is the erection of factories and of dwellings for the work people and superintendents. This is usually followed by the erection of retail shops, repair shops, garages, etc. Next banks are required for the local business, and doctors, lawyers and other professional men move in. Churches, schools, hospitals and public buildings spring up, necessitating clergy, teachers, nurses, officials and clerks, and this is probably later followed by improvements in communication, i.e., additional railway connections, street railways, and motor bus connection to neighbouring towns, all necessitating increased population.

WORLD'S POULTRY CONGRESS

Every detail in connection with the World's Poultry Congress, which will be held in Ottawa during the week of July 27-August 3, is well in hand, and the officers in charge are now awaiting the influx of delegates and visitors and the arrival of the national, institutional, and commercial poultry exhibits which will form a feature of the Congress. Arrangements for the meetings, which will be officially opened by His Excellency Lord Willingdon, Canada's Governor General, and Rt. Hon. W. L. Mackenzie King, Prime Minister, on Wednesday, July 27, have also been completed. The Congress will be the largest gathering of the kind ever held, forty countries being represented.

After the official closing of the Congress on August 3, an auction of the exhibits from countries outside of North America will be held. As these exhibits will represent the best in poultry from every part of the world it is expected that a good proportion will remain in Canada.

A lake and river, tributary to Minago river in Manitoba, have each been named Hargrave after J. J. Hargrave, the well-known chief factor of the Hudson's Bay Company, who related his fur trade experiences in *Red River*, a book published in 1871.

PROTECTING MIGRATORY BIRDS DURING SPRING

Provision in Treaty Between Canada and United States Has Proved Beneficial

"If spring shooting of migratory game birds had not been abolished throughout North America in 1916 there would not now be left a sufficient number of birds of certain important species to provide shooting for any body, either in spring or fall."

This considered opinion of a Canadian game conservationist brings into high relief the benefits of the Migratory Birds Treaty between Canada and the United States and the Acts which implement it. The complete extinction of the passenger pigeon shows that this is not an overstatement, for while the case of the passenger pigeon presents peculiar features, nevertheless the fact remains that this beautiful and useful bird was exterminated because of lack of protection at the spring nesting time. The passenger pigeon in the 80's of the last century flocked in Canada and the northern United States by millions, yet so rapid was the process of extermination that this bird had completely disappeared nearly thirty years ago.

This and other facts concerning the possible practical extermination of some of our remaining species of migratory game birds—geese, ducks, etc.—have led to the general acceptance by sportsmen of the prohibition of spring shooting as a necessary provision. Under the old piecemeal methods of local regulation on the one hand, and the decreased area of breeding grounds and increased efficiency of hunting arms on the other, many species of migratory game birds were, before 1916, dwindling in numbers in a most rapid and alarming manner. Crossing as they did provincial, state, and national boundaries in their semi-annual flights, the birds could not be protected unless the regulations were continent-wide. That was secured by the Treaty and like good sportsmen the different provinces and states are playing the game. In the United States the shooting of ducks and geese stops on January 31, so that these birds are protected on their northward flight to Canada.

Everyone knows that there is no surer way to exterminate any animal or bird than to pursue and harry it immediately before and during the breeding season. Taking into consideration that every bird arriving in Canada has survived a winter and two migrations, it is probably not over the mark to say, from the standpoint of bird conservation, that each bird killed in spring is the equivalent of four or five killed in the autumn. The abolition of spring shooting, according to reports from all parts of the country, has increased the fall flights, and birds are now nesting in localities where they had not been seen for so long that people had come to believe they had never nested there. The object, of course, in these measures is not to reduce human profit and pleasure but to increase it by perpetuating and increasing the numbers of the animals or birds concerned. Speaking of the country as a whole, Canada has held a good stock of moose and deer and is rapidly bringing back the buffalo and the elk, and there is every reason to believe that the same happy result will follow the efficient management of North America's wild ducks and geese.

DIFFICULTIES ENCOUNTERED BY SURVEYORS IN ROCKIES

Inclement Conditions Met With in Upper Passes During Alberta-British Columbia Boundary Survey

The difficulties which have to be overcome by Government surveyors in the performance of their duties are seldom realized by the layman. During the recent running of the Interprovincial Boundary line between Alberta and British Columbia the work in the Miette Pass was greatly delayed by bad weather and untoward conditions. It snowed for eight days in succession and the work had to be carried on with 21 inches of wet heavy snow on the floor of the valley and from 3 to 4 feet on the hillsides above timber line; horse trails had to be shovelled out to the higher monument sites and here most of the time the temperature was below freezing; concrete had to be made with hot water so as to overcome the frozen condition of the gravel; and hot rocks had to be laid around the concrete in order to permit it to set. At times it was found impossible to use horses and the men had to pack the equipment and materials. Notwithstanding all this the angles read at the most exposed stations above timber line closed within perfectly normal limits.

BIRD BANDING OPERATIONS ON CANADA'S ARCTIC COAST

Bird banding operations were carried on along the Arctic coast of Canada by Mr. W. H. B. Hoare, of the North West Territories and Yukon Branch of the Department of the Interior, during the course of his two years of investigations in northern Canada. Three young duck hawks were banded on July 30, 1924, on the Arctic coast between Babage river and King point, Yukon territory, and one of these was killed near Duchesne, Utah, on February 20, 1925. The young hawk covered at least 2,300 miles in its migration south.

Another item of interest to ornithologists and bird lovers in general was the banding of three young robins at a point not more than twenty miles from the Arctic ocean. The nest in which the young birds were found was in the northernmost clump of spruce on the Coppermine river in the Northwest Territories of Canada.

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THE NEW WELLAND SHIP CANAL

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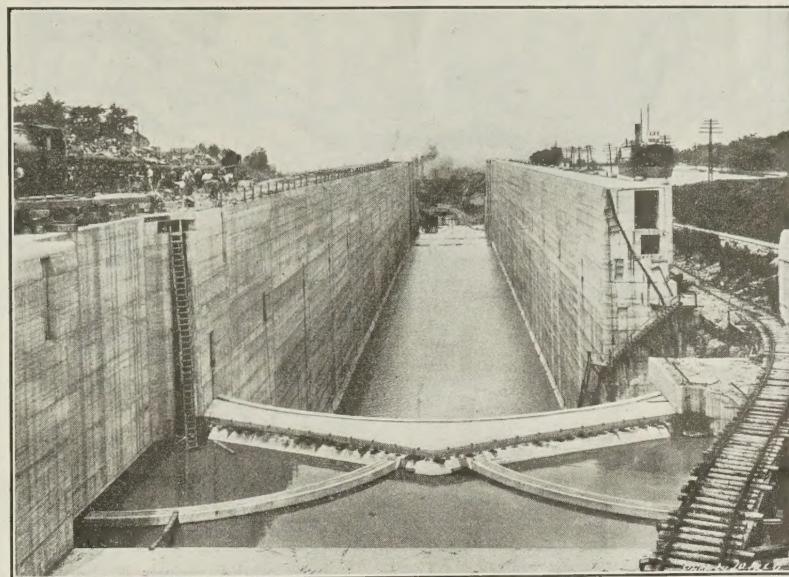
12 feet by raising the banks along the canal reaches and increasing the height of the lock walls.

This canal sufficed for about twenty-five years when the requirements of navigation called for further enlargement, and work was begun on the construction of the present canal by the Dominion Government, with masonry locks 270 feet long, 45 feet wide, and with 12 feet of water on the sills. This canal was completed in 1882 and since then the depth has been increased to 14 feet by raising the banks and lock walls. The present canal was built on an entirely new location from lake Ontario to the village of Allanburg. Within this distance all of the locks occur and the location offered a straighter channel, the result being a reduction in the length of the canal from twenty-seven and a half miles to twenty-six and three-quarter miles.

The immense improvement which will be brought about by the reconstruction now in hand is evident from the following facts. The number of locks is being reduced from 25 to 8. The usable length and breadth is being increased respectively from 270 feet and 45 feet to 800 feet and 80 feet, while the depth on the sill will be 30 feet. These dimensions at once place the present work in the front rank, and in fact in some respects it stands absolutely unequalled. The Panama canal has a highest level of 85 feet above sea level. The highest lift for any lock is slightly over 30 feet compared with 46½ feet negotiated at each lock of the new Welland canal. Furthermore a flight of three twin locks at Thorold effects a rise of practically 140 feet, and as regards its "mass concrete" is comparable with the great Gatun locks at Panama.

The route of the new canal departs from that of the former ones to a very considerable extent, taking a straighter course and further reducing the distance to twenty-five miles. It is being built on a new location from lake Ontario to Allanburg, a distance of twelve miles. From Allanburg to lake Erie the course of the present canal is more or less followed.

The size of the lock culverts has been calculated so that a lock chamber can



The New Welland Ship Canal—Looking north along the canal at Thorold, Ontario. Lock No. 7 is seen in the foreground and to the right a section of the present canal with a freight steamer passing through. Comparison of the size of the lock with the steamer to the right and the construction train to the left gives a good idea of the dimensions of the new canal.

be filled or emptied in about eight minutes. The time required to pass a vessel through one of the ship canal locks will be about twenty minutes and the estimated time of passing a loaded freight vessel through the entire canal is eight hours, as against fifteen or eighteen hours on the present canal. When traffic is heavy or becomes congested for any reason, several vessels of present canal size can be passed through the ship canal locks at one lockage. Up to the present the length of vessels reaching lake Ontario either from the St. Lawrence or from lake Erie has been about 250 feet, but with the completion of the new canal it will be possible for the 600-foot freighters now plying the upper lakes to pass into lake Ontario and the upper St. Lawrence.

The history of canal communication between lake Erie and lake Ontario is one of almost constant enlargement and reconstruction to meet the rapid growth of trade and commerce on the Great Lakes, and the consequent steady increase in size of vessels plying these waters. At no time during its existence of nearly a century has the Welland Canal been able to keep very far ahead of the development of lake trade, but it is confidently expected that the capacity of the new Welland Ship Canal will be sufficient to provide for marine development for many years to come.

CANADA IS CHIEF SOURCE WORLD'S NICKEL SUPPLY

(Continued from page 1)

In 1926 a total of 1,309,782 tons of nickel ore was smelted at Sudbury, producing 78,643 tons of matte containing 39,038 tons of nickel and 24,159 tons of copper. During the same year 34,908 tons of matte were exported and 33,489 tons were refined at Port Colborne. Precious metals recovered during the refining of Canadian nickel-copper mattes at Port Colborne, Ontario, and at Clydach, Wales, had in 1926, a total value of well over \$1,500,000.

From the time of the payment of its first dividend, in 1894, to the end of 1926, the International Nickel Company and its predecessor the Canadian Copper Company, had paid \$71,338,590 in dividends; and the Mond Nickel Company, since 1906, \$20,017,671. As far as financial resources, adequacy of ore reserves, operating efficiency, progressive management, and expanding

markets for their products are concerned, both the nickel companies are in a highly enviable position, with a future that never looked more promising.

Of special interest at the present time are the plans for expansion recently announced by the President of the International Nickel Company and now under way at the Frood mine near Sudbury. It is believed that the International Nickel Company's Frood mine is part of an immense deep-lying deposit of copper-nickel ore, the other part of which, known as the Frood Extension, is owned by the Mond Company. In the International's Frood alone there is estimated to be 100,000,000 tons of ore, or enough at the present rate of consumption to supply the world's demands for seventy-five years. This is now being opened up by a 5-compartment shaft that will be sunk to a depth of 2,300 feet. A considerable amount of time and a large expenditure of money will be needed to finish the shaft, erect the permanent surface plant, and develop the ore-body sufficiently for the carrying on of mining operations, but it is expected that the Frood will be brought into production within the next five years. When this is done the Creighton mine, the International Company's present chief source of supply and the richest and largest deposit yet worked in the district, will take second place; and its ore will be used almost entirely for the production of monel metal while that of the Frood will be worked up into refined nickel. This will add considerably to the International's profits, since the Frood ore is much higher in the platinum metals than that from Creighton and these can all be saved in the Company's nickel refinery as now operated; in the production of monel metal the precious metals are not recovered.

The Mond Nickel Company also is actively developing the Frood Extension, having completed a shaft 2,030 feet deep from which levels are being developed at 1,700 and 2,000 feet.

This summer when the Empire Mining and Metallurgical Congress visits the mines and smelters at Sudbury and the refining plant at Port Colborne, Ontario, members who represent interests in all parts of the world will have the opportunity of obtaining first-hand knowledge of the great nickel industry with which Canada is so closely associated.

ADDITIONAL HISTORIC SITES ARE SELECTED

Historic Sites and Monuments Board at Annual Meeting Recommends a Number For Marking

At the recent annual meeting in Ottawa of the Historic Sites and Monuments Board of Canada a number of additional sites were selected for marking at some future date. The most outstanding of these were:—

At North Sydney, Nova Scotia.—Canadian terminus of the first Atlantic cable.

At Jemseg, Queen's County, New Brunswick.—Fort Jemseg, first trading post on the St. John river, built in 1764.

At Ile-aux-Basques, St. Lawrence river, near Trois Pistoles, Quebec.—An early centre for whale fishing.

At Ile-aux-Noix, near St. Johns, Quebec.—To commemorate the services of the Navy on lake Champlain.

At Hull, Quebec.—The first portage around Chaudiere falls, Ottawa river, used by explorers, and early missionaries and traders.

At Normandale, Norfolk county, Ontario.—First blast furnace for the manufacture of iron in western Ontario.

At Brantford, Ontario.—Fording place across the Grand river used by Chief Joseph Brant (1742-1807).

Brandon House, Manitoba.—An early fur trade centre established 1794; located at the confluence of the Assiniboine and Souris rivers, and about 21 miles southeast of the present city of Brandon.

At Carleton, Saskatchewan.—Fort Carleton, famous in the early history of the Canadian northwest.

At Banfield Creek, Barkley sound, Vancouver island, British Columbia.—Terminus of Pacific cable connecting Canada with Australia, completed in 1902.

At Victoria, British Columbia.—Fort Victoria, an early Hudson's Bay Company post and the centre of the first organized British government on the Pacific—the colony of Vancouver Island, formed 1849.

At Point Grey, Vancouver, British Columbia.—Meeting place of Captain George Vancouver, R.N., and the Spanish explorers in 1792.

The members of the board who attended the meeting were Brigadier-General E. A. Cruikshank, Ottawa, (Chairman); Judge F. W. Howay, New Westminster, British Columbia; Dr. J. H. Coyne, St. Thomas, Ontario; Judge Philip Demers, Montreal, Quebec; Dr. J. C. Webster, Shédiac, New Brunswick; Judge W. Crowe, Sydney, Nova Scotia; Mr. J. B. Harkin, Commissioner, Canadian National Parks, Ottawa; and Major A. A. Pinard, Secretary. The board acts in an advisory capacity and the responsibility for carrying out the recommendations rests upon the Canadian National Parks Branch of the Department of the Interior.

Telegraph passage, Skeena river, British Columbia, was named in 1865 when large supplies of telegraph wire were landed there in that year to carry out the construction of a telegraph line from America to Europe via Bering strait. On the successful laying of the Atlantic cable in 1866 the scheme was abandoned.

ACTIVITY IN CANADIAN ARCTIC THIS SUMMER

SS. "Beothic" Sails on July 16—New Police Schooner for Western Arctic

Each year sees the improvement of the conditions under which the administration of the Canadian Arctic—East and West—is carried on.

Citizens are becoming familiar with the Eastern Arctic through written descriptions, photographs and motion pictures which have been made accessible to the public as a result of the annual cruises undertaken by the Department of the Interior. Hitherto no artist, as such, has visited the far north, but this year Mr. A. Y. Jackson, R.C.A., Toronto, a number of whose canvases hang in the National Gallery at Ottawa, will accompany the annual expedition of the North West Territories and Yukon Branch, Department of the Interior, on the ss. *Beothic*, and will make pictures of the scenery and the natives. He will, among other subjects, put on canvas a view of Canada's "farthest north" post at Bache Peninsula, which it is expected will be permanently hung in the National Gallery or wherever may be deemed the best place for exhibiting such a picture.

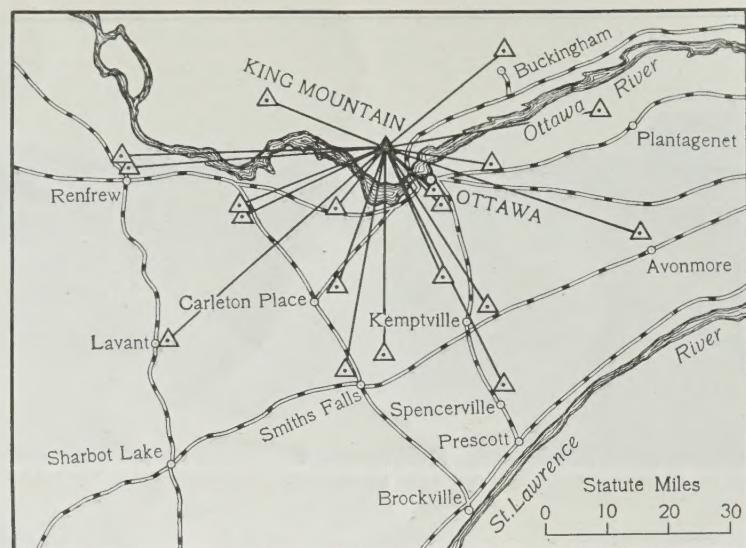
In addition to the artist, a medical officer, Dr. F. H. Stringer, has been appointed Ship's Doctor, to take the place of Dr. Livingstone, who spent last winter on Baffin Island on behalf of the Department of Indian Affairs, and who accompanied former expeditions. The usual health inspections of the natives will be continued.

It is intended this year to make a reconnaissance survey into the very heart of the Canadian Arctic Archipelago in order to investigate ice conditions along Lancaster sound, and an attempt will be made to penetrate as far west as Melville island. The *Beothic* will leave Sydney, Nova Scotia, about July 16, the expedition being again in charge of Mr. G. P. Mackenzie.

There will be considerable other activity in the North this year as Commander Donald B. MacMillan of the Rawson-MacMillan Sub-Arctic Expedition, representing the Field Museum of Natural History, Chicago, and Mr. G. P. Putnam of the Putnam Expedition, representing the American Museum of Natural History, have both secured permits from the Department of the Interior to travel and make investigations in the Franklin District of the Canadian Arctic.

With regard to the Western Arctic, patrols have been carried out from Royal Canadian Mounted Police stations at Herschel, Baillie Island, Bernard Harbour, and Cambridge Bay for many years but only under great handicap. Steps are now being taken to remove some of the difficulties under which the police work in the Western Arctic Sub-District. In the past the commercial ocean-going vessels have been relied upon for relief of the personnel and the transportation of supplies to the stations along the Arctic coast of the District of Mackenzie, the ss. *Beothic* being fully occupied in attending to the posts around Baffin bay in the east.

The inconveniences of the system have been great owing to the fact that the captains of ocean-going vessels are not able to round point Barrow, Alaska, on the inward journey, until relatively late in the season, with the result that the time left for calling at the police



Historic Importance of King Mountain—Diagram of portions of the provinces of Quebec and Ontario showing the different triangulation stations visible from King Mountain station, Quebec.

stations is limited and the farthest east stations of this administrative area have sometimes been left unvisited. On the outward journey, the ship must leave sufficiently early to round point Barrow and gain access to the Pacific before ice conditions become threatening. Since the captains are usually responsible for valuable cargoes of furs they are naturally anxious not to delay departure.

The Royal Canadian Mounted Police have long felt the need of having a patrol boat under their own control, which would work from a base in the Western Arctic and be capable of navigating the Arctic seas during the entire period when the channels are open. Specifications were drawn up in May, by the Department of Marine and Fisheries, for the building of such a vessel and shipbuilding firms have been asked to submit tenders. The boat will be of the auxiliary schooner type with a length of 95 feet, breadth 24 feet, and draft when fully loaded of 12 feet 6 inches; her speed will be about 8 knots per hour. She is to meet in every way the requirements of the Royal Canadian Mounted Police service between Herschel island and the stations of the Western Arctic Sub-District east of this point. She will be specially strengthened and equipped for working and wintering in the ice in order that her complement of thirteen officers and men may, if necessary, serve as a floating detachment at any place on her patrol. The boat will be schooner rigged with two masts and her auxiliary power will be provided by a 3-cylinder, 125-horse-power internal combustion engine. She will be equipped with wireless and completely fitted out to perform her special work. The vessel will operate from Herschel, the most westerly post of the Royal Canadian Mounted Police on the Canadian Arctic coast, and will visit at regular intervals the posts of Baillie Island, Bernard Harbour, and Cambridge Bay to the east, as well as any other stations which may be established in the future.

Tsimpsean peninsula at the mouth of Skeena river, British Columbia, is named after an Indian tribe. Investigation by the Geographic Board of Canada to determine the spelling of the name reveals a multiplicity of spellings, such as Tsimishean, Timshian, Chimsain, Timpsonian, Tsimp Sheean, Chimsyan. The name means "people living on the banks of the Skeena."

HISTORIC IMPORTANCE OF KING MOUNTAIN

Rocky Prominence North of Ottawa Was Starting Point of Canada's Geodetic Triangulation System

Many visitors to Ottawa, and most residents of the vicinity, are familiar with King Mountain, the prominent hill about nine miles north of Ottawa which is reached by a half hour's climb on a well beaten path from Kingsmere, Quebec. Most skiers are familiar with the hills in this district and a visit to the rocky outlook point well repays the climb. Visitors to the eminence have admired the beautiful view of the thirty-mile stretch of the Ottawa River valley, including the city of Ottawa, and of the portion of eastern Ontario, spread before them.

Fewer visitors have noticed a copper bolt embedded in the surface of this bare rock, yet this is a historic site, for at this point the triangulation system of the Geodetic Survey of Canada, Department of the Interior, whose operations are so essential to the construction of accurate maps, was started in 1905. Since 1905 about 5,800 miles of triangulation have been laid down from the Atlantic to the Pacific.

From this splendid elevation nineteen other triangulation stations of the Geodetic Survey of Canada are visible, the farthest being 50 miles southwest, a few miles north of Sharbot Lake, Ontario. Other visible points include one near Renfrew, 44 miles; one near Smiths Falls, 38 miles; one near Spencerville, 45 miles; one near Avonmore, 48 miles; and one near Plantagenet, 38 miles. The height of the rocky observation point is 1,215 feet above sea level.

A press note last May told of the unveiling of a tablet memorial that had been affixed to a gun in Cannon Field, Hampton Hill, England, to commemorate the 200th anniversary of the birth of Major-General William Roy, F.R.S., who conceived the idea of carrying out the triangulation of Great Britain and of making a complete map therefrom. By the inauguration of this work he laid the foundations of the British Ordnance Survey.

King Mountain bears the same relation to the Canadian triangulation system as Hampton hill does to that of England, and doubtless some monument will be erected to commemorate its historic significance and to serve as a memento of the work of the late Dr. W. F. King, C.M.G., first Superintendent of the Geodetic Survey of Canada, and the late C. A. Biggar, first Assistant Superintendent.

matter and decide upon a policy which will have every chance of success.

The Porsild brothers spent eight months of last year investigating the underlying causes which have brought about the successful establishment of reindeer in Alaska. They worked down the Yukon river towards its mouth and trekked by dog team to Kotzebue and on to Point Barrow, covering all the country to the southeast of the latter place, and finally reaching Aklavik in March, 1927. During the present year they are working out from the delta of the Mackenzie and will cover the Great Bear Lake district with a view to ascertaining how far the conditions in Mackenzie District compare with those in Alaska.

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SANCTUARY SET ASIDE FOR MUSK- OX PROTECTION

COVERS AN AREA OF 15,000
SQUARE MILES

Situated in Valleys of Hanbury and Thelon
Rivers in Northwest Territories
of Canada

Canada has just taken an important step in the work of conserving the musk-ox by establishing a sanctuary in the valleys of the Hanbury and Thelon rivers east of Great Slave lake in the Northwest Territories.

Why should Canada care for the musk-ox? Because it is one of the most wonderful and most potentially useful of all our big game animals. Canada's effort to save it is not actuated by sentimentality but by business prudence. The Dominion Government must care for the big game for the sake of the Indian and Eskimo inhabitants, both from humanitarian motives and as a means of maintaining a vigorous native population, without which the development of the various resources of the north would be impossible. The Northland has important big game animals other than the musk-ox but the characteristics of the latter are such as to make it exceedingly valuable. It is a big, strong animal, exceptionally free from disease, which can defend itself against all enemies except men armed with high-powered rifles; its flesh, and pelt are excellent and its quiet habits give grounds for the belief that it can be readily domesticated. The massive body, intense vitality, and thick coat of woolly fur give the musk-ox complete protection against the storms and cold of the Arctic winter as well as the heat and insects of the Arctic summer, and these qualities, together with its habit of pawing away the snow and getting at the herbage beneath, render unnecessary the semi-annual migrations which lay open other big game animals to the attacks of their enemies. In a word the Arctic is the place where the musk-ox has thriven for hundreds of years and where it will continue to thrive if given protection from new enemies. It is thus peculiarly the big game animal of the Canadian Arctic.

By means of the reports of explorers and experts in wild life the Government of Canada has been apprised of the changing conditions, and recently it became apparent that it must act promptly if the musk-ox was to be

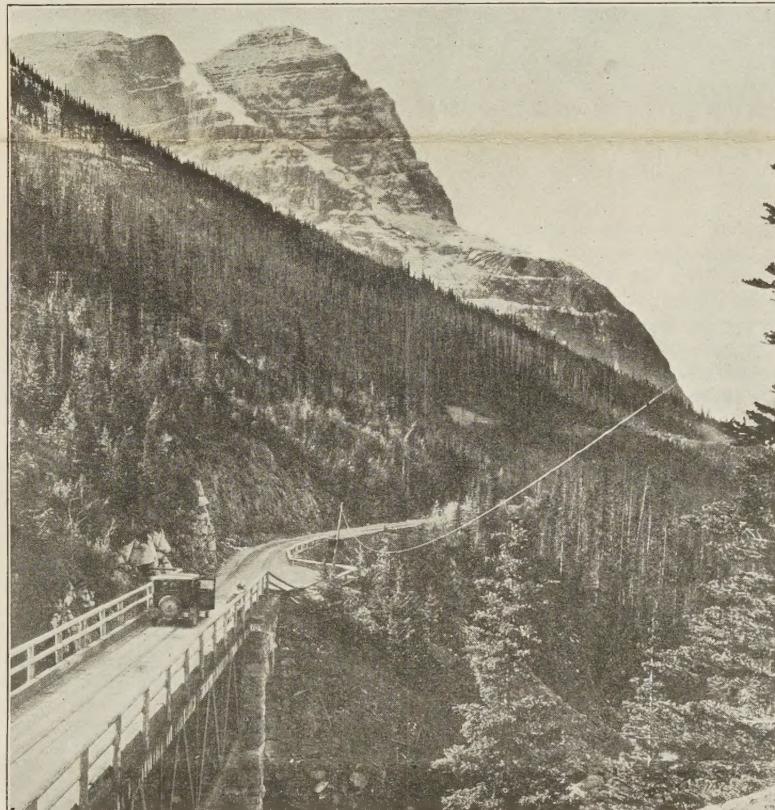
(Continued on page 4)

MOTOR TRAVEL TO NATIONAL PARKS

New Highways Bring Increasing Throngs From All Parts to Canada's Scenic Playgrounds

While the influx of visitors to the Canadian national parks may be largely attributed to the fact that the people of Canada, the United States, and the world in general are gradually coming to realize more and more the value of these great scenic reservations as health and recreational resorts, nevertheless the Department of the Interior's pro-

Rocky Mountains and Kootenay national parks, has been exceptionally high. At the Kananaskis gate, the eastern entrance to the highway and to Rocky Mountains park, 11,519 cars passed through during the months of April, May, and June of this year as compared with 8,913 for the corresponding period last year. During the first fifteen days



Motor Travel to National Parks—View along the Kicking Horse Trail showing mount Stephen in the background. A good idea of the engineering difficulties that had to be overcome and the permanent character of roadbed and bridges may be gained from this picture.

gressive program of extending parks' highways has been an important factor in the growth of the tourist traffic. During the year 1926 tourist travel to the parks reached a new peak, but early reports received in the Canadian National Parks Branch for the present season indicate that the previous high mark will be equalled, if not eclipsed, this summer.

Motor travel figures invariably show the trend of general tourist traffic. To date this season the number of motor cars passing over the Banff-Windermere highway, which traverses

of July, 1927, no less than 8,502 cars were registered at this point. At the western entrance to the highway in Kootenay national park, 3,794 cars were registered up to the middle of July, which is a substantial increase over the figures for the same period last year. At Mount Rundle motor camp near Banff all previous records for a single day were broken on July 13 when there were 518 cars and 2,108 persons on the camp grounds.

The distinctive advance in the construction of motor trails in the Canadian

(Continued on page 8)

REVIEW OF COAL MINING INDUSTRY IN NOVA SCOTIA*

ONLY FIELDS ON ATLANTIC COAST OF AMERICA

First Coal Taken Out in Seventeenth
Century—Greatest Exports From
Sydney Field

In the Journal of Admiral Hovenden Walker it is recorded as regards Cape Breton, Nova Scotia, that "the island had always, in time of peace, been used in common both by the English and the French for loading coals, which are extraordinarily good here and taken out of the cliffs with iron crow-bars only, and no other labour". In such manner in the latter part of the 17th and in the first decade of the 18th century began the exploitation of the only coal-fields on the Atlantic coast of America.

Underground mining was first attempted at Cow Bay or Morien in 1720 to provide fuel for those engaged in the erection of the fortress of Louisburg, but for a hundred years mining of coal was carried on in a desultory and wasteful manner. Heavy royalties exacted by the Crown, short term leases, wasteful mining methods, illegal depredations upon seams outcropping in the sea cliffs, all contributed to throttle production. From 1825-28 began a new era of development. During that period a company, known as the General Mining Association, gained control of practically all coal leases. Active mining under trained men brought from the Old Country soon began in the Sydney and Pictou fields and resulted in an increase of annual production from 21,000 tons in 1828, to 294,000 tons in 1858. But a more noticeable advance began with the establishment of an allied steel industry in 1880 which brought the production in 1900 to 3,000,000 tons. In 1913, the banner coal year of the province, the steel industry absorbed 60 per cent of the coal consumption of Nova Scotia and the output that year rose to 7,000,000 tons.

The coal reserves became the property of the provincial government in 1849 and the royalties derived from the lessees on the basis of 12½ cents per ton now provide the chief source of the provincial revenues.

*Prepared at the direction of Dr. Charles Camsell, Deputy Minister of Mines, by Dr. W. A. Bell, Geological Survey of Canada.

(Continued on page 8)

SAFEGUARDING OUR FOOD SUPPLY*

Important Work of Department of Health in Preventing Sale of Unwholesome Foods

All matters pertaining to Canada's food supply are of such vital importance that Parliament has enacted legislation to prevent misrepresentation of foods as well as fraudulent or dangerous adulteration. The legislation is centered in the Food and Drugs Act which is administered by the Department of Health as one of its many functions in the public service.

The following résumé of one year's activities gives a glimpse of what is being done to prevent undesirable complications and to maintain quality and honest marketing of our food supplies, apart from agricultural inspection at production centres. Twenty-six inspectors of food and drugs were on duty throughout Canada and laboratories were operated at Ottawa, Halifax, Montreal, Winnipeg, and Vancouver. In all over 10,000 samples of foods and drugs were examined. Many of these were from import shipments, others were purchased in retail stores, and still others taken direct from factories.

A wide range of foods is covered by these investigations and a close watch is kept on the various brands marketed. This may be seen from the following list of foods receiving special attention and the number of samples taken in each case: apples, 25; baking powder, 64; bread, 7; butter, 570; candies, 78; canned vegetables, 71; cheese, 175; celery, 60; barley, graham flour, 53; coffee, 260; cocoa, 73; diabetic and invalid foods, 34; dried fruits, 493; food colours, 630; gelatin and jelly powders, 100; honey, 49; ice cream, 171; jams and jellies, 70; milk (evaporated, condensed, powdered), 69; nuts, 249; olive oil, 135; oranges, 590; pickles, 45; raisins, 97; soft drinks, 457; sausages and Hamburg steak, 214; spices, 905; sugar, 72; syrups and molasses, 420; and mineral waters, 61.

It was found that Canadian apples were not dangerously contaminated with arsenical residues from orchard sprays. Butter adulteration by the addition of cocanut oil (not uncommon in other years) has been checked. Caramel samples in a large collection were for the first time in several years found free from paraffin wax. One stock of canned corn on the cob was found to be sour and was excluded from market. An import shipment of so-called "canned pineapple" consisting of macerated pineapple cores was held until properly labelled. Undeclared colouring matter was detected in one brand of tomato catsup.

Dairy products such as cheese and milk (powdered, evaporated, or condensed) were all found to be of good quality. Of 171 samples of ice cream examined only five were found to contain less than 9 per cent of milk fat (legal minimum 10 per cent). Imported citrus fruits, while showing some damage from frost were on the whole as good as could be expected.

Special attention was paid to inspection of import shipments at ports of entry. The Canadian market, which

must never become a dumping ground for the refuse of other markets, was protected from inferior consignments of the most varied nature, including food dyes, package spices, wormy and moldy nutmegs, nuts, tomato paste, beans, and frosted oranges.

Four large shipments of dried fruits were refused entry into Canada because they contained excessive amounts of sulphur dioxide, indicative of careless processing with a possibility of imperfect drying and recovery after having been

RE-ESTABLISHING ELK IN CANADA

Rapid Increase in the Number of These Characteristic Big Game Animals Under Protection

Another chapter in wild life conservation in Canada has been written in connection with the elk. At one time these animals roamed in great numbers over the greater part of the continent. In Canada their range included parts of Quebec and Ontario, and extended westward through the Prairie Provinces into British Columbia. Some time ago excessive hunting had reduced their numbers to a most alarming extent in every part of the continent. Game authorities realized that if the animals

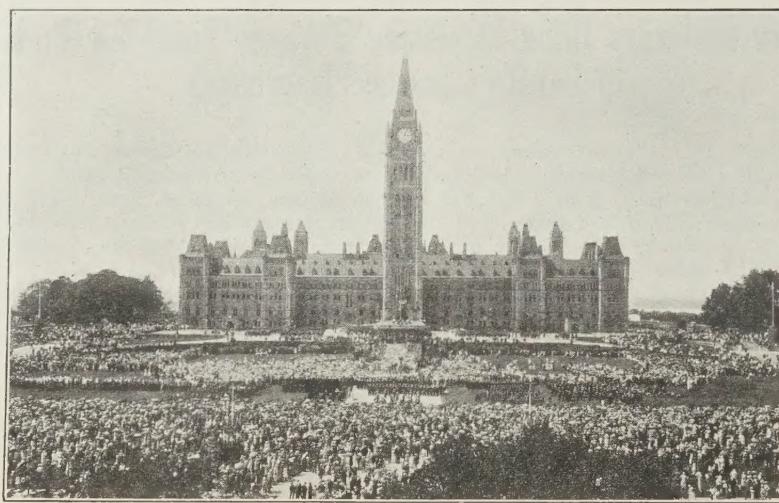
herd at Wainwright, Alberta, were shipped to Cookson, British Columbia, and released.

The rapidity with which elk increase under protection is best illustrated by a review of the growth of the herds in the various Canadian National parks in Western Canada. One of the earliest herds formed was that at Banff in Rocky Mountains park, Alberta. The records show that the Banff herd originated from five animals purchased in January, 1900 from the late Mr. Valentine Winkler, then a member of the Manitoba Legislature. Between 1902 and 1910 six animals were added by purchase, and in the latter year six of the Banff herd were moved to the then recently established Buffalo park at Wainwright as the nucleus of a herd there.

Owing to a shortage of winter range in Yellowstone National park in the United States a number of shipments of elk were made to Canadian parks in 1917 and again in 1920. Sixty-three animals were sent to Banff in the former year in exchange for Rocky Mountain goats and Bighorn sheep which were sent to Washington, D.C. In 1920, 206 elk were shipped to Rocky Mountains park and 98 to Jasper park.

The growth of the herds has been remarkable and there are now over 3,000 elk in the national parks. When the Banff herd grew too large for the enclosure it was released in Rocky Mountains park and it is now estimated that there are about 750 animals roaming over the 2,751 square miles in this reserve. Reports from Jasper park place the number of elk there at about 1,500 and state that they are to be found in nearly every valley, having re-occupied their original range. The herd in Buffalo park at Wainwright has grown to 449 and at Elk Island park there are 390 animals.

Success in this work, equal to that attained in the national parks, has been achieved in other parts of Canada where the elk have been rigidly protected. Through close seasons and the provision of sanctuary the elk are rapidly returning and this species will, in the not distant future, again take its place among the characteristic big game animals of the Dominion.



The Heart of Canada's Diamond Jubilee Celebration. Throngs gathered on Parliament Hill, Ottawa, on July 1 for the official ceremonies which were broadcast to every part of the Dominion.

dangerously near to spoilage at some time during preparation. The regulations prohibit the use of preservatives such as sulphites in sausage and Hamburg steak. Saccharin, the well-known artificial sweetner without food value, is properly a drug and may be injurious to the health of any person taking 4½ grains or more per day. Its indiscriminate use in the manufacture of beverages and foods is therefore prohibited. Diabetics who cannot take sugar may use saccharin as part of their treatment, but should not regard it as having nutritive value.

Corrections were made in deceptive advertising in connection with certain brands of bread, biscuits, honey, and evaporated milk. Inspection of labels is also a very important feature of this work. Every year there is an increase in the number of packaged foods offered for sale, and an effort is being made to protect the rights of the purchasing public by insisting on a full measure of truthful statements appearing on the labels. A label may be deceptive, not only because of statements made, but also by inference from what is omitted. The statement of net contents on packages is important and action was required to secure accurate declaration in many instances, such as olive oil, spices, and pickles.

Food is not destroyed unless satisfactory utilization is impossible. Destruction was found necessary for the disposal of certain seizures of deteriorated baking powder (17 years old); nuts (moldy and wormy); oranges (frosted and spoiled); dried apples (moldy and wormy).

Thirty-nine prosecutions arising from adulteration of meats (including Ham-

wurst steak and sausages), maple syrup, maple butter, molasses, candy, and jams, were instituted only after the objectionable practices were found to be wilful and persistent. In many cases breaches of the law are committed through lack of knowledge, but the damage done is not extensive although it can be easily seen that matters would ultimately assume a serious aspect if it were not for the preventive action of this Service.

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Tsimpsean peninsula at the mouth of Skeena river, British Columbia, is named after an Indian tribe. Investigation by the Geographic Board of Canada to determine the spelling of the name reveals a multiplicity of spellings, such as Tsimishean, Timshian, Chimsain, Tsimpsian, Tsimp Sheean, Chimsyan. The name means "people living on the banks of the Skeena."

The name Lemieux has been approved for a chain of islands at the entrance to Cumberland sound, Baffin island, Franklin district, Northwest Territories. The islands have been named after the Hon. Rodolphe Lemieux, the Speaker of the House of Commons, Canada.

*Prepared at the direction of Dr. J. A. Amyot, Deputy Minister, Department of Health, Canada, by Mr. H. M. Lancaster, Chief Dominion Analyst, Ottawa.

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REVIEW OF COAL MINING INDUSTRY IN NOVA SCOTIA

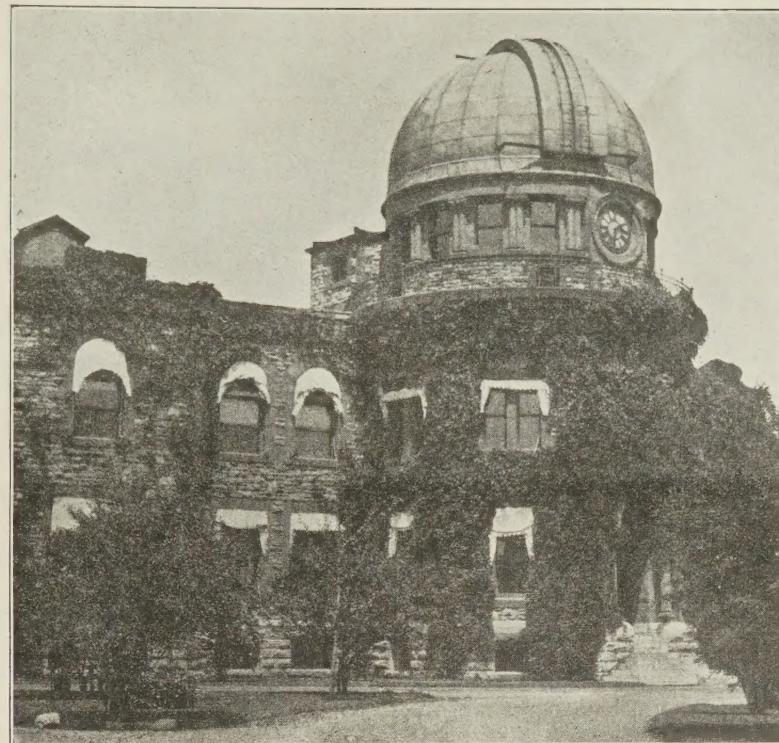
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The major part of the coal exported from the province is mined in the Sydney field and is despatched in the summer months in special steamers to St. Lawrence ports. In the Montreal market Nova Scotia coal has to meet the keen competition of coal from the United States.

The Sydney field, area about 200 square miles, supplies approximately 75 per cent of the total coal production of the province. Except at the margins of the field there is an absence of faulting, and the seams dip uniformly in gently pitching synclines and anticlines beneath the sea. The largest mines are all producing from submarine areas, some of the workings running for more than 2 miles under the sea. There are nine seams in the field each exceeding 3 feet in thickness and with a total thickness of 42 feet. Three of these are worked at the present time. About 130 million tons of coal have been won from this field and there is an estimated reserve of $2\frac{1}{2}$ billion tons within economic mining distance. The "room-and-pillar" method of working is being replaced to some extent by "longwall", according to local needs. A single colliery, Dominion No. 2, established in 1900, has produced more than 20 million long tons. At Dominion No. 1B, a shaft sunk close to the shore in 1921 and completed to a depth of 670 feet in 1923, taps an area wholly submarine that has an estimated coal reserve of 140 million tons. The minimum life of this colliery has been estimated at 125 years. The mine equipment is capable of an output of 2,500 tons per 8-hour shift, and the working face is more than $2\frac{1}{4}$ miles distant from the shaft.

Of the several small coal fields in western Cape Breton the Inverness alone is now producing. Restricted land areas and faulting handicap the present economic exploitation of these fields.

The Pictou field is an isolated inlier of 25 square miles in area. It is subdivided into three producing areas, the Thorburn, Albion, and Westville, of which the Thorburn coals are the youngest and the Westville the oldest. The field is unique in its great thickness of lacustrine dark shales that include



View of the Dominion Observatory, Ottawa, from the southwest. It was here that observations were made of the movements of the Pons-Winnecke comet.

LEADING FACTS ABOUT PONS-WINNECKE COMET

Great Interest When This Celestial Traveller Passes Near the Earth

Comets have always had a great fascination for "the man in the street", perhaps greater than any other class of celestial object. This is true, of course, only when the comet is sufficiently bright to be seen with the unaided eye. It is the general testimony of history during many hundreds of years, that comets have been considered to be peculiarly ominous of the wrath of heaven and harbingers of wars and famines. Indeed it is within the limits of truth to say that such misappre-

hensions have not yet entirely died out. Fortunately, however, science has dispelled them to such an extent that the unscrupulous can no longer profit by them. But, while these false ideas are nearly eradicated, there still remains in the human mind (and quite rightly so) a keen interest in comets, and, therefore, the announcement that a comet would come very close to the earth during the month of June excited worldwide interest.

This comet was first observed by Pons, at Marseilles, on June 12, 1819. The astronomer Encke announced that it was a periodic comet with a period of five and a half years, and observations since then have proved that his period was a very close approximation to the truth. It was not seen from 1819 until March 8, 1858, when Winnecke observed it and thought it was a new comet. The identity of the two objects, however, was soon established and since then it has been known as the Pons-Winnecke comet. It was observed in 1869, being described as very faint but of considerable diameter. It has been observed on several occasions since, its last appearance, previous to the present year, being in 1921. At no time has it been a conspicuous object but rather an inconspicuous member of the solar system. There had never been any indication of a tail or any increased activity in the head as it passed close to the sun, so there was no reason to expect a brilliant object this year.

The unusual interest evinced by the public was due to the announcement that it would pass near to the earth. This close approach was due to the fact that the comet and our earth arrived simultaneously at the critical points, thus bringing the two bodies within a distance of three and a half million miles on June 27. The nearest approach to the sun was on June 21. The movements of the comet were followed very closely at the Dominion Observatory, Ottawa, during the month of June, photographs being taken on every fine moonless night. These exposures varied from fifteen minutes to two hours and revealed a comet with a diffuse, nebulous head. There was no sign of a tail except on the plates of two hours exposure. These latter showed a fairly sharp star-like nucleus,

THE CELEBRATION OF CANADA'S DIAMOND JUBILEE

From Coast to Coast Citizens Joined in Marking Dominion's Sixtieth Birthday

The characteristics of the celebration, held on July 1-3 to mark the Diamond Jubilee of the confederation in 1867 of British North American colonies into the Dominion of Canada, were its spontaneity, its universality, and its note of thankfulness for the progress made in sixty years along all lines of national endeavour. Though the time between the passing of the Jubilee Resolution in Parliament and Dominion Day was comparatively short the enthusiasm with which citizens in every part of Canada entered into the preparations for the event resulted in the holding of worthy celebrations not only in the federal and provincial capitals but also in the cities, towns, villages and rural communities from Atlantic to Pacific. Of the Ottawa celebration the unique feature was the broadcasting of the official addresses, the national anthem and patriotic songs, and the music of the carillon, just installed in the Peace Tower of the Parliament Buildings. This sending forth of the living message from the capital to the remotest bounds of the nation and beyond, symbolizes both the advance of science and the increase in solidarity of the Dominion in the sixty years since confederation.

MOTOR TRAVEL TO NATIONAL PARKS

(Continued from page 1)

Rockies this year was the completion of the Kicking Horse Trail. This new highway forms the final arc in a new scenic circle, a loop route that encloses one of the richest scenic regions in the Rockies, having the Banff-Windermere highway as its southern arm, the Kicking Horse Trail as its northern, while the existing Columbia River Highway unites the two. On July 9, 1927, the formal opening of the Kicking Horse Trail took place and reports received indicate that the new motor highway is already in favour with the touring public of the continent. During the period, July 1-15 a total of 807 cars passed over the road. In Yoho National park, as in the other parks, a large percentage of the motor visitors are from points in the United States.

Similar reports of heavy tourist travel have also been received from Waterton Lakes and Jasper national parks.

similar to the other plates, and a faint suspicion of a tail not over one-half of a degree in length. When observed with the unaided eye the comet had the appearance of a very faint nebula or hazy patch in the sky. To those who expected a dazzling object with an immense tail stretching across the heavens it was a disappointment, but not so to the astronomer familiar with its past history. It appeared on scheduled time and behaved just as it did during the many times it was observed on previous returns. It has never been anything but a diffuse, nebulous object with a small central nucleus; and it is a safe prediction that in the centuries to come it will be a faint object varying in brightness only as it is close to or far from the earth.

HOW THE WEATHER MAN ASSISTS THE FORESTER

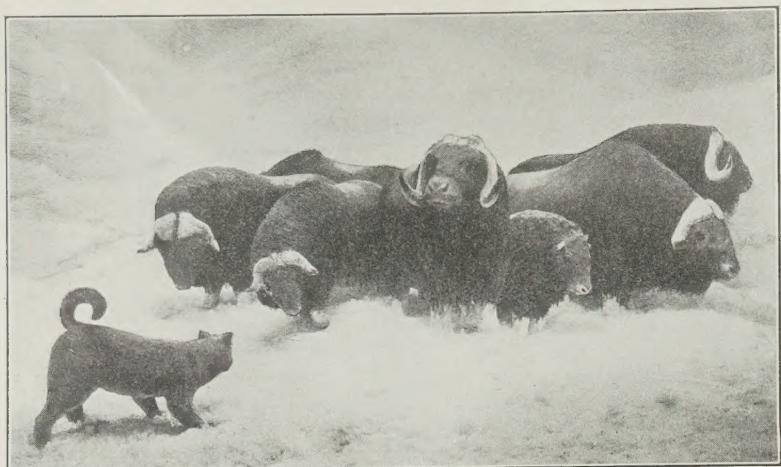
Study of Weather Conditions Proves Valuable Aid in Prevention of Forest Fires

Advancing civilization and settlement in a wooded country like Canada increases the forest fire hazard, but our fire fighters are ever on the alert to offset this by making use of the discoveries of science—the telephone, the radio and the aeroplane. One of the latest aids to be drawn into service is the weather forecast. The inflammability of the leaves, twigs, branches and other litter on the forest floor, in which fires start or spread, depends on the amount of moisture they contain. It has been found that if these materials contain more than 25 per cent of their dry weight of moisture, fires will not start. As they dry out below this point, fires will start more and more readily until at 10 per cent moisture content fire will start from an unextinguished cigarette butt. The amount of moisture in these materials depends on the rainfall and the relative humidity of the air. As everyone knows, the air always contains a certain amount of water vapour. The capacity of air to hold moisture varies with the temperature. For instance, air at a temperature of 90° F. will hold exactly twice as much moisture as it will at 68° F. The amount of moisture which the air contains at a given temperature compared with what it could hold at that temperature is called its relative humidity. When it contains all the moisture it will hold, its relative humidity is said to be 100 per cent. If it contains only half as much as it could, the relative humidity is said to be 50 per cent.

Forest materials absorb moisture from the air when the relative humidity is high, and in turn give off moisture to the air, or dry out, when the relative humidity is low. Forest fires tend to die down at night because the lower night temperature raises the relative humidity of the air to the point where the forest materials will begin to absorb moisture, and so have their inflammability reduced. In the same way, when the relative humidity is high enough during the day, the materials, if wet, will not dry out, and, if dry, may even absorb moisture from the air and become non-inflammable. Wind, rain, and temperature all have an effect on the moisture content of forest materials, but the relative humidity of the air is the greatest single factor governing their inflammability.

It will be seen from the foregoing that the weather has a very important bearing on forest protection. In common with other modern organizations charged with forest protection, the Forest Service of the Department of the Interior has been at work securing data whereby the best use can be made of these natural laws. Information is being gathered covering not only each forest and each natural division of a forest, but also the effect on the situation of topography, season of the year, and nature of forest cover and these are being related to one another and to other factors. The road is not a short one but already there are indications of good results.

From the study of the weather forecast and the record of the weather for the preceding few days, a forest officer is able to see whether the hazard is increasing or decreasing, and what points are most vulnerable. He can thus concentrate his forces on certain areas,



Picture of a mounted group of musk-ox in the National Museum, Ottawa. The animals are shown in the formation which they assume when attacked by wolves or dogs.

SANCTUARY SET ASIDE FOR MUSK-OX PROTECTION

(Continued from page 1)

saved. On the advice, therefore, of the Minister of the Interior an Order in Council was passed setting aside an area of 15,000 square miles comprised in a district about 200 miles long and 75 miles wide stretching from Artillery and Clinton-Colden lakes eastward, on both sides of the Hanbury and Thelon rivers, to Beverley lake. The sanctuary is under the administration of the North West Territories and Yukon Branch of the Department of the Interior.

This region has been selected because in it there are no trading posts or permanent residents, either white or native. In fact, as it has been a no-man's land between the Indian and the Eskimo hunting grounds, it has been avoided by both from time immemorial, but with the rapid advance of trappers and traders who are converging toward these valleys from Hudson bay on the east and the Mackenzie river on the west, it would be a matter of only two or three years before the musk-ox entirely disappeared from their present range.

This area has been repeatedly reported to contain some of the remaining musk-ox herds. Explorers like Messrs. J. W. and J. B. Tyrrell, Hornby, Critchell-Bullock, and Blanchet, all saw musk-ox there; the last three explorers reporting their presence within the last two years. Mr. J. W. Tyrrell in the report of his trip in 1900 notes:

"As we glided quietly down the river [Thelon], one of the most interesting features met with was the occurrence of numerous bands of musk-ox feeding upon the luxuriant grass or sleeping on the river bank."

Mr. John Hornby in 1925, a quarter of a century later, though not looking especially for musk-ox reports seeing about sixty in this part of his exploratory trip. On August 3 he noted in his diary: "The grass was plentiful and the willows thick and high. It

[the district about Grassy island, Thelon river] appeared to be an ideal place for the musk-ox which hitherto seem to have been undisturbed, for they show no fear, only curiosity. . . . This area would make an ideal sanctuary for wild animals and birds."

PATROLLING CANADA'S ARCTIC ARCHIPELAGO

SS. "Beothic" Left Sydney on July 16 With Expedition—Makes Good Progress

The ss. *Beothic* carrying the Department of the Interior's 1927 expedition to the Canadian Arctic islands sailed from Sydney, Nova Scotia, on July 16. This summer's patrol of the archipelago will include, besides the usual visit to each post with provisions and relief personnel, a cruise up Lancaster sound, Barrow strait, and Melville sound, and the establishment of a new post on the southern coast of Baffin island at Lake Harbour.

Mr. George P. Mackenzie, of the North West Territories and Yukon Branch of the Department of the Interior, is again the officer in charge, with Dr. F. H. Stringer as medical officer. Capt. E. Falk is master and Capt. L. D. Morin, ice pilot. Mr. W. Q. Ketchum, is secretary to the officer in charge. Dr. M. O. Malte, botanist, National Museum of Canada; Dr. F. G. Banting, of Toronto; and Mr. A. Y. Jackson, artist; are going North with the expedition. Inspector C. E. Wilcox, officer in charge of the Eastern Arctic Sub-District, Royal Canadian Mounted Police, and the following non-commissioned officers and men are also on board: Sergt. J. E. F. Wight, Corp. O. G. Petty, and Constables E. Anstead, G. T. Makinson, A. H. G. Margetts, P. Dersch, and C. J. Cox.

Mr. E. J. Mead, of the Engineering Staff of the Canadian Marconi Company, Montreal, is wireless officer and every effort will be made to duplicate last year's performance of keeping the ship in daily communication with the Department at Ottawa.

Making a good run up the Labrador coast the *Beothic* reached Godhavn, Greenland, on July 23. After the usual exchange of courtesies the expedition sailed for Pond Inlet, Baffin island. When within twenty miles of this post it was found the ship could get no nearer on account of the ice. The expedition then turned northward and reached Dundas Harbour, Devon island on the 27th. The next ports of call in the order named will be Craig Harbour and Bache Peninsula on Ellesmere island.

IMPROVED TOWERS FOR GEODETIC SURVEYING

Use of Specially Constructed Ladders a Great Aid in Reconnaissance

In all geodetic operations, extreme accuracy is the goal and the attainment of this entails the use of considerable field equipment as well as painstaking labour on the part of the survey parties engaged. Nevertheless everything is done to keep down expenditures in this highly scientific branch of survey work, and whenever possible improved devices are adopted which enable more rapid progress to be made without the sacrifice of accuracy.

One of the chief functions of the Geodetic Survey is to determine the latitude and longitude of selected points throughout the country as a basis for mapping. In order that this may be done with the greatest accuracy it is necessary that the points selected, the so-called "stations", should be intervisible. The straight lines joining the stations form a series of triangles known as the triangulation net. Modern instruments admit of the sides of the triangles making up the nets being very long. To obtain the necessary intervisibility between stations far apart, sturdy towers constructed of a strong timber framework, and sufficiently high to overtop intervening obstacles, have for many years been used in rough or heavily timbered country. From the tops of such towers instrument readings are made to far distant stations.

The engineer who is engaged in primary reconnaissance frequently experiences difficulty in determining the height of a tower which is required to make certain stations of a triangulation system intervisible. It was to overcome this difficulty, which under the circumstances might result in the erection of a rigid tower too low or too high for the purpose required, that the Geodetic Survey of Canada, which is a branch of the Department of the Interior, has within recent years adapted to its needs an improved form of reconnaissance tower or "observational ladder", which for certain purposes is a great saver of both time and money.

The ladder tower is simple in construction and very economical to erect. It is composed of interchangeable sections about 12 feet long but which overlap to the extent of 2 feet making the useful length about 10 feet. When joined together they form two vertical ladders about two feet apart, resting on sleepers on the ground and connected to one another by pairs of cross braces at intervals of 5 feet. Four sets of guys, the first placed at about 30 feet from the ground and the others at intervals of 15 feet, hold the ladders steady. A table is fitted to the top of the ladders with room for the observer's head and shoulders in the centre and upon which instruments and maps can be placed.

The observer climbs up the interior of the cage, formed by the ladders and cross braces, without any fear of falling backwards. On reaching the top he is well supported by the table which surrounds him during the period of observation.

In two hours two experienced men can raise one of these ladder towers to a height of 80 feet if necessary, and can dismantle it in half that time. A complete set, with guys, weighs only 1,000 pounds and can be conveniently transported in a motor truck.

direct loggers to cease operations in areas of especial hazard, prohibit or allow the burning of loggers' or settlers' slash, etc. At first sight it might appear that results would be comparatively small, but that is an inadequate view of the situation. The aim of the forest conservationist is to prevent rather than extinguish fires, and everything which assists this effort is of great value; and then the conservation forces at present available are so small in comparison with the vast estate to be protected that administrators dare not fail to seize every weapon which modern science brings within reach.

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LAUNCH AERIAL ATTACK ON FOREST PESTS IN CANADA*

OPERATE AGAINST SPRUCE BUDWORM

Dominion and Provincial Services Test
New Methods of Combating Destructive
Forest Insects

An experiment in controlling the dreaded spruce budworm by means of poisoned dust distributed over the forest by aeroplane has been conducted by the Entomological Branch of the Dominion Department of Agriculture in co-operation with the Royal Canadian Air Force and the Provincial Forest Branch of Nova Scotia, on an area near Orangedale, Cape Breton island. The investigations were later continued on a larger scale in Guysborough county between the towns of Guysborough and Mulgrave. The plan of operations was revised and checked by the Research Division of the Forest Service of the Department of the Interior.

The aeroplane employed was of the type used in the southern United States for dusting the cotton fields to control insects affecting cotton. The plane was obtained specially for these forest dusting experiments.

The insecticides chosen were those already in use for the control of orchard and cotton insects, namely: calcium arsenate and lead arsenate, in the form of a very fine powder. This powder is distributed during flight at the discretion of the pilot from a specially designed hopper situated in the forward compartment of the plane. The machine flies within about twenty feet of the tree tops in the calm air of early morning and a dense volume of the dust is swept backward by the wind from the propeller and swirls into and through the foliage in a wide swath, approximately one hundred feet in width, covering the foliage completely with a thin coating of powder.

The objects of the work in Nova Scotia during the past summer were to determine the most effective kind of dust and the poundage per acre necessary to kill the caterpillars of the spruce budworm, to determine the cost of the operation on a large scale, and also to devise the most efficient methods for conducting such an enterprise on large

*Prepared at the direction of Dr. J. H. Grisdale, Deputy Minister of Agriculture, by Dr. J. M. Swaine, Associate Dominion Entomologist.

(Continued on page 4)

CANADA'S RESOURCES IN GAME

The Dominion's Plentiful Supply Ensures Good Hunting— Each Province Offers Characteristic Attractions

There is a growing realization by sportsmen in all parts of the world of the great resource Canada has in her game. This is denoted by the fact that Canada is rapidly becoming one of the leading big game countries of the world, due to good fortune in having a large original stock of these animals and to efficient conservation of them by wise

more plentiful in that section than they were then, and people today value big game too highly to run any risks of its extermination by poaching and pot-hunting.

Thus, all over Canada, there is a growing realization of the value of the resource we have in big game and a determination to make the best use of



Hunting Big Game in Canada—Party of deer hunters starting out by canoe for the hunting ground. The trophies of a previous day's hunt are to be seen amid the trees at the camp.

laws, close seasons, and sanctuaries. The climatic and soil conditions which have given Canada her wheat fields and her timber lands have also provided grazing grounds and winter shelters for a great variety of big game. Canada's forests and open spaces were, on the arrival of the first white men, abundantly stocked with game, and although both animals and birds retired before the advance of settlement there was fortunately in every section of the country some natural sanctuary into which they could retreat to live and multiply in safety. There was a time, in early days, when settlers, striving to clear lands for cultivated fields, looked upon the forest and the game it contained as a phase of development that must pass away. In those days there was little regard for season or sanctuary but fortunately Canada was so big and the hinterland so vast that the game escaped destruction. Heavy inroads were sometimes made on certain species, and a historian writing in 1825 predicted the early disappearance of the moose from a certain district. Today, a hundred years later, moose are much

it for today and for tomorrow. The idea that prevails in some countries, that game is a luxury in which the average citizen is not interested, has no foothold in Canada because the opportunities for sport are open to everybody. In this age too, when life in town and country is lived at high tension, recreation is necessary for all, and the best forms of recreation are those which keep people in the open air and which provide a change from the regular occupations of life. This is true in a high degree of hunting, whether with gun or camera. People are becoming seized of the fact that game is a great natural resource and one that must not be permitted to decrease, and further, that in Canada hunting is not carried on at the expense of any other interest. In crowded Europe in old times arable fields were turned into forests to make hunting grounds for the wealthy, but Canada is fortunate in having great stretches of land suited only to the growing of timber, and to forests the regulated hunting of game is not an injury; on the other hand this contact

(Continued on page 4)

MANITOBA ENTERS PAPER-PRODUCING FIELD IN CANADA

FIRST MILL IN PRAIRIE PROVINCES

Forest Resources and Water Powers of
Province Basis of New Development

When in 1870 the members of the Red River Expedition under Lord Wolseley had pulled their guns over the last portage of the Dawson trail—around Pine falls—how little they dreamed that on that very site would one day be reared the first paper-mill in the Prairie Provinces! Perhaps the outstanding feature of the first thirteen years of this century in Canada was the population influx that peopled the prairies and made wheat the barometer of our national prosperity; much as the next thirteen has been featured by the marvellous growth of the pulp and paper industry.

For obvious reasons, the eastern provinces first experienced the major development in this vast new forest industry, but it was inevitable that Manitoba should also come into her own, for that province is also the habitat of the spruce tree—two-thirds of her surface is forest land—and on many of her rivers are magnificent water-powers. The development of these resources will tend to do for that province what the exploitation of similar natural wealth has done and is doing for Eastern Canada.

The development of the pulp and paper industry in Manitoba promises to be of great value to settlers by providing a ready market for pulpwood cut from their holdings during the process of land clearing operations. Further, this important auxiliary source of revenue, as it becomes available, will enable the extension of settlement into the remoter wooded areas.

The Pine Falls townsite and the Manitoba Paper Company's mill are located on the south bank of the Winnipeg river, a little above its mouth and about 70 miles northeast of Winnipeg. The millsite has been pronounced one of the finest on the continent, while the townsite has been laid out for a population of 4,000 by a town-planning expert, and nothing has been overlooked that will help to make Pine Falls a model town with every modern convenience and service required for private or communal welfare. The mill itself is compactly built and thoroughly equipped with every modern device to reduce overhead and increase output.

(Continued on page 3)

IMPORTANT GATHERING OF EMPIRE'S MINING MEN*

Mining and Metallurgical Congress Meeting
in Canada—Will Inspect Chief
Mining Centres

The second meeting of the Empire Mining and Metallurgical Congress, at which hundreds of mining men from all parts of the Empire are gathered to discuss many important matters related to the development of the Empire's mineral wealth, opened in Montreal on August 22. The technical side of the program includes the presentation of papers containing the results of extensive research on problems encountered in various economic phases of mining and metallurgy, and this opportunity for the exchange of views and ideas is proving of the greatest value to the mining and metallurgical industries not only within the Empire, but throughout the world.

Incidental to the work of the Congress the visitors are taking advantage of the opportunity to acquaint themselves with mining in Canada and to secure first-hand information regarding the varied and extensive mineral resources of the Dominion. Specially planned tours are now in progress which cover the entire country from the Atlantic to the Pacific, and visits are being made to most of the more important mining camps and metallurgical plants. In all, sessions and excursions covering a six-weeks period have been arranged.

It is well known that the last quarter of a century has been a period of remarkable development and expansion in Canadian mining. The actual position of the Dominion among the mineral-producing countries of the world may, however, be a matter of surprise for many. Canada, in fact, supplies 90 per cent of the world's nickel, 85 per cent of its asbestos, 55 per cent of its cobalt, 9 per cent of its gold, nearly 9 per cent of its silver and of its lead, 6.4 per cent of its zinc, and 4 per cent of its copper. In world production the Dominion is first in nickel, cobalt, and asbestos; third in gold and lead; and fourth in silver. Mineral bearing deposits are found in many parts of Canada and recent discoveries and developments indicate that Canada's contribution to the world's metal markets has future possibilities of even greater importance. A vast area of mineral-bearing territory, probably the largest and most promising to be found anywhere, still remains unexplored and unprospected.

Some of the most unique individual mineral deposits in operation in the world today, not only from a standpoint of present output, richness and size of their known ore-bodies, but also in respect to possibilities for future industrial expansion, are located in Canada. The Hollinger, Creighton, Premier, and Sullivan mines rank amongst the world's greatest producers.

The year 1926 witnessed a total mineral production in Canada valued at more than \$241,000,000, an advance of more than \$13,000,000 on the previous high record of 1920, notwithstanding the fact that the level of metal prices was approximately 35 per cent higher in that year than in 1926. The sustained and increasing demand is contributing to the expansion

CANADA'S LIGHTHOUSE SERVICE

Important Work Carried On in Making Our Shores and Waterways Safe For Marin

Every moment of every hour, day and night throughout the year, ships great and small approach, leave, and sail along Canada's fifty thousand miles of seacoast and lake and river shore; and should a light be darkened, a foghorn silent, or a buoy misplaced even for an hour, shipwreck is imminent, with all it means in loss of life

iron murette 7 feet high, glazing 12½ feet high and copper dome supported on steel framing, weighs 24 tons.

The optic or projecting apparatus consists of built-up lenses and refracting and reflecting prisms, mounted in gun-metal framing, and having four optical faces, the diameter being 2.66 metres or over 8 feet, and the weight of gun



Canada's Lighthouse Service—View of the light at Cape Race, Newfoundland, the largest and most important Canadian station and one of the eight or ten largest in the world. Inset. The giant optic which concentrates the power of the light so that it can be seen for a distance of 76 miles.

and property. This is what makes Canada's lighthouse service so important and the discipline of the organization so rigorous. Those who travel only occasionally by ship are apt to imagine that the service manages a few lighthouses and foghorns at dangerous points, and places buoys in intricate channels. It will, therefore, be somewhat of a surprise to those who have not given the matter much thought to learn that the Lighthouse Service of Canada of the Department of Marine and Fisheries has under its control 1,725 lights (nearly all of them lighthouses), 364 fog signals, 517 gas and signal buoys, 6 submarine bells, 11 lightships, 49 lighted spars, and 8,365 unlighted buoys. This total of 11,037 separate aids to navigation is distributed over 50,000 miles of seacoast, lake, and river and includes twelve main coast stations in Newfoundland, established there for the benefit of shipping entering and leaving Canadian ports.

The largest and most important Canadian station, and one of the eight or ten largest in the world, is situated at Cape Race, the southeast point of Newfoundland. A description of this light will give an idea of the character of the equipment which the nature and hazards of the work demand. The tower is built of reinforced concrete, cylindrical in form, 18 feet in diameter and 70 feet high; the cliff on which the tower stands is 87 feet above sea level. The lantern, enclosing the lighting apparatus, is of the same diameter as the tower and 37 feet high from the deck or top of the tower to the vane. The focal plane of the light is 165 feet above high water. The lantern, consisting of cast

metal and glass 5½ tons. This optic is caused to revolve by clockwork at the rate of one revolution in 30 seconds, and, in order to attain the requisite speed and steadiness, is mounted upon a round cast-iron table floated in mercury. The total weight floated is 7 tons and the quantity of mercury required to float it is, by reason of the peculiar design of float and bath, only 950 pounds. The pedestal and clock weigh 11 tons, which, with the weight of the optic and lantern, make a total load of 42 tons on the top of the tower.

The source of light is electric power generated at the station; in addition there is a stand-by oil vapour apparatus. The latter is so designed that the oil is vapourized and the oil vapour is burned under a gas mantle about 3½ inches in diameter. The mantle gives a light of 2,400 candles (the light generated by electricity is substantially the same), which on passing through the optic is collected and concentrated to 1,100,000 standard candles, that is, each of the four faces of the optic projects a 1,100,000 candle-power beam of light. These beams, by reason of the rotation of the optic sweep around the horizon and give the effect of one flash every 7½ seconds. Under favourable weather conditions this light has been seen a distance of seventy-six miles.

The fog alarm at Cape Race is of the diaphone type operated by compressed air. The instrument is arranged to give a blast of 3½ seconds duration every 30 seconds, and has been heard a distance of forty-five miles. The power required to operate the light and fog alarm is supplied by two 50 horsepower boilers and the coal consumption is about 500 tons per annum. The station staff consists of four lightkeepers, and continuous watch is maintained day and night throughout the year.

The lights and other aids located at other points on the seacoast and along

of nearly all the producing districts, and providing an incentive to the development of new areas, many of which are approaching the stage of substantial production.

ARCTIC PATROL SHIP MAKES GOOD PROGRESS

SS. "Beothic" Now Well Advanced on Homeward Voyage—New Post Established

The cruise of the *Beothic* to the Canadian Arctic Archipelago continues to make satisfactory progress.

The latest information officially received indicates that she has reached Lake Harbour on the south coast of Baffin island where a new post is to be established.

Leaving Sydney, Nova Scotia, on July 16 the expedition arrived at Dundas Harbour on July 27, after touching at Godhavn, Greenland. Proceeding out of Dundas Harbour next day she called at Craig Harbour on July 29; Etah, Greenland, July 30; and reached Bache Peninsula, on Ellesmere island, her northern objective, on July 31. Ice conditions in the last named place were unusually bad, owing to the lateness of the Arctic summer this year, and some difficulty was experienced in unloading supplies. On the return journey Craig Harbour was touched on August 2, and Dundas Harbour, August 3. From the latter point the attempt was made to penetrate Barrow strait westward as far as Melville island before proceeding southward to Pond Inlet. The result was not as successful as had been hoped. Beechy island at the west end of Lancaster sound was reached but all efforts to proceed into Barrow strait were frustrated by the ice which packed in the narrows separating Cornwallis and Somerset islands. After a three days struggle against wind, fog, and ice the *Beothic* turned eastward and touching at Port Leopold and Arctic bay on Lancaster sound finally headed south to Pond Inlet, which post was reached on August 13. Ice conditions here also delayed progress and anchorage had to be shifted; it was not until August 17 that the last supplies were landed and the expedition continued its course.

Dr. Livingstone, who spent last winter among the natives of Baffin island was taken on board at Pond Inlet and will accompany the expedition home. During his stay he accomplished the difficult feat of patrolling 2,000 miles of the bleak terrain lying between and behind Pond Inlet and Pangnirtung. A single native accompanied Dr. Livingstone and he visited settlements of which the native populations aggregated over 1,000 persons.

Continuing her voyage from Pond Inlet the *Beothic* rounded cape Walshingham on August 20 and reached Pangnirtung, Cumberland sound, on August 21. From this point she proceeded to Lake Harbour to establish the new post.

the great lakes are proportioned to the needs of the situation in each case but, whether large or small, the constant effort is to maintain a high standard of efficiency throughout the service.

It is estimated by the Forest Service that the only economic use for three-eighths of the land area of Canada lies in the growing of trees. This vast area of territory, while incapable of successful agricultural production, is, if permanently dedicated, protected, and managed, suited to the production of a timber crop which would guarantee for all time the supply of raw material for Canada's wood-using industries.

*Prepared at the direction of the Deputy Minister, Department of Mines, Ottawa.

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BUFFALO AND REINDEER IN NORTHERN CANADA

Further Shipments Made to Wood Buffalo Park—Preliminary Report on Reindeer Investigation

The North West Territories and Yukon Branch of the Department of the Interior has been giving special attention to the buffalo and the reindeer during the present summer.

The work of transferring this season's shipments of surplus buffalo from the Buffalo national park at Wainwright, Alberta, to the Wood Buffalo park near Fort Smith, Northwest Territories, was completed early in August. Altogether 1,940 young animals—one-, two-, and three-year olds—were shipped from Wainwright and arrived at their new location with trifling losses. As usual, shipment was by rail from Wainwright to Waterways, thence by scows down the Athabasca and Slave rivers to the point of unloading, which is a short distance above Fitzgerald.

The wardens in Wood Buffalo park report that the animals shipped in 1925 and 1926 are doing well on the good herbage of this immense natural range and that many calves were seen, indicating that the herds are multiplying satisfactorily.

A preliminary report has also been received on the reindeer investigation which is now being carried on in the Mackenzie District of the Northwest Territories, and for which purpose the Department of the Interior engaged the services of two experts last year. These men spent the better part of last season in Alaska securing information on the underlying reasons for the success of the industry there.

The investigation in the Mackenzie District has for its objects the thorough scientific study of the climatic, soil, and range conditions of the Mackenzie valley and Great Bear Lake district, with the purpose of ascertaining: what factors favour the introduction of reindeer; what the effect of the reindeer industry would be on the country



The Pulp and Paper Industry in Manitoba—Aerial view of the Manitoba Paper Company's mill at Pine Falls on the Winnipeg river about 70 miles northeast of the city of Winnipeg.

MANITOBA ENTERS PAPER-PRODUCING FIELD IN CANADA

(Continued from page 1)

The terms under which this initial paper project has been brought into being and by which it will operate in future have been carefully formulated by the Honourable Charles Stewart, Minister of the Interior, with the object of conserving the public interest and at the same time providing an opportunity for the development of this new industry. Upon the Department of the Interior, through the Forest Service, rests the heavy responsibility of safeguarding and developing the future producing power of the forest lands to which the company must look for its supply of raw material.

and on the population; and whether the conditions necessary for reindeer raising are as favourable in the Northwest Territories as in Alaska.

The program for this summer includes a thorough reconnaissance of the country between the Mackenzie delta, Liverpool bay, and Anderson river. On the opening of navigation in the spring of 1927 the experts started to make a traverse of the chain of lakes—Husky lakes—on the route to Liverpool bay. The trip was of fifteen days' duration and covered a distance of between three and four hundred miles. Botanical specimens were collected and the report which has lately been received states that the areas so far inspected are not inferior to those seen in Alaska.

As soon as the ice had left the Arctic seaboard the party worked out from Aklavik for the purpose of making a survey of Richards island and the territory in the vicinity of Kittigazuit. The journey will be continued eastward along the coast to Liverpool bay, where the coast and hinterland will be investigated, and probably a canoe trip will be made up Anderson river. It is hoped that sometime this autumn the party will be back in the Mackenzie delta with data from which a preliminary map of the area covered can be made.

During the winter headquarters will be made in the vicinity of Kittigazuit, from which point the work will be continued later. The investigation of the Great Bear Lake district will probably be carried out in 1928.

The annual loss of timber at present suffered by Canada's forests through the agencies of fire, insects, and disease is greater than the amount annually used for all industrial purposes.

USE OF RADIO IN SURVEY OPERATIONS IN CANADA

Wireless Telegraphy Has Greatly Enlarged Scope of Work of Surveyor and Astronomer

Excellent results in longitude determination are now being obtained by radio-telegraphy in the survey work of the Department of the Interior, Canada.

The longitude of any desired point may be derived from the known longitude of some other point by the simple process of adding to or subtracting from the known longitude the difference in sidereal (astronomic) time, expressed in terms of arc, which is found to exist between the two points. Simple though this operation is in theory, in practice it involves the necessity of being able to compare the times in two distant places at the same instant. Such an instantaneous comparison of times could only be made in the past by telegraphic methods and relatively few places where the surveyor operates are connected by telegraph line. Radio telegraphy has provided a solution to the problem, and has greatly enlarged the scope of astronomical work generally.



An Aid to Navigation on the Great Lakes—The lighthouse at Southeast Shoal in lake Erie about eight miles east of Point Pelee. This light replaces the lightship maintained at this point for many years.

The Canadian farm woodlot plays a conspicuous part in the growth of forest products. According to the last census the total annual value of products provided by farm woodlots was \$72,000,000, which was over 32 per cent of the value of all forage crops. About one-third of the pulpwood used in Canadian pulp mills comes from settlers' holdings.

ARTIFICIAL SILK INDUSTRY IN CANADA

The Dominion's Vast Supplies of Pulpwood Offer Great Possibilities For Development

When we gaze on a great forest tree it is not easy to visualize it in terms of rich cloth and silken raiment. And yet man, not content with silk, cotton, wool, linen, and a number of other fabric materials, now employs wood for the manufacture of the latest of textiles—artificial silk, or rayon, as it is called by the trade. The basis of all artificial silk is cellulose, and cellulose is the principal constituent of wood.

As long ago as 1889 Count Hiliare de Chardonnet produced artificial silk, but it has taken many years of incessant labour to bring the various processes to that stage of perfection which is essential to commercial success. That the industry has now become a great undertaking is shown by the fact that the world's production has risen from 7,500 tons in 1909 to an estimated 100,000 tons for last year.

The general principle underlying the manufacturing methods is the treatment of the cellulose with chemical reagents to give a gelatinous solution which can be forced through a number of minute nozzles into a bath of another solution (or in one process into air). This latter solution causes the coagulation of the liquid emerging from the nozzles and thus creates the actual filaments of artificial silk, though the material has to pass through several other stages, varying with the process, before it finally emerges as that glistening transparent gossamer to which we are now so accustomed, but which would have amazed people fifty years ago.

The possibilities for rayon manufacture in Canada, with her vast pulpwood areas, are enormous. The countries which were first to develop the industry, however, were not those which possessed much raw material, but those which already had the organization, the equipment and the markets for a big textile industry. Thus, shortly before the war, France, already predominant in the manufacture of natural silk, took the lead, followed by Switzerland. Now the big producers and exporters are the United States, Great Britain and the countries of central Europe that are prominent in the natural silk trade.

For a good many years Canada has supplied much of the sulphite pulp used for the manufacture of artificial silk in these countries. An artificial silk plant was established by British interests in eastern Ontario in 1924. This appears to be but the preliminary of many others. There are several projects on foot for the development of the industry in Canada by companies organized for this purpose and by pulp and paper companies; operators of some of the important mills have been carrying on chemical research for some time in the utilization of hemlock for the production of cellulose. Certain conclusions have been reached which are favourable to the development of this side of the industry. The artificial silk field on this continent is a large and profitable one, and Canadian resources, both in wood reserves and natural power supplies, are factors which particularly favour Canada in competition with other countries.

HOW TOPOGRAPHIC MAPS OF CANADA ARE MADE

Accuracy and Attention To Detail Are Paramount Considerations—Importance of Maps

Canada stands today on the threshold of a period of great expansion. Large sums of money are being devoted to the development of her natural resources, and regions that yesterday seemed part of the remote wilderness have already become scenes of intense activity where the riches of the mine and forest, unknown a few years ago, are now contributing to the wealth of the Dominion. The problems involved in the location of railway lines, water-powers, industrial plants, etc., are great and their solution is dependent to a large extent on the making of reliable maps. The Topographical Survey of the Department of the Interior, provides a service in this regard which is of prime importance in the development of the country.

The amount of work entailed in gathering accurate information and conducting survey operations upon the basis of which maps are prepared, and the diverse and highly technical services which are necessary to the production of the finished product are not generally realized. A true topographic map, particularly of well settled country, presents a multiplicity of detail, the extent of which varies only with the scale used. This wealth of detail, from whatever sources it may be derived, must all be correlated and brought to a common basis so as to be readily interpreted by the map-reader. Attention to detail is, therefore, a paramount consideration in map compilation, and ways and means have been devised for effecting this systematically and without confusion. Mechanical aids in the reduction of this information are made use of, by processes that have in some cases been originally worked out here and in other cases adapted from those used in other countries.

When it is desired to bring out a new map sheet, all available previous information is considered and is supplemented by actual field investigation conducted for the purpose of completing the topographic detail. This field investigation is carried on by surveyors who cover the ground, using methods which are best adapted to the particular purpose and the character of the country. The actual field work is ordinarily divided into two parts: first, the laying down of control points; and, second, the filling in of the topographic detail. The control itself is similarly divided into two parts: the horizontal control, and the vertical control. The former gives the geographical position and the latter gives the elevation which supplies the basis for contouring. In both cases control points are established and fixed so that later, on this framework, the map may be properly built up and all requirements met for the scale used.

Actual ways of carrying on the field work may vary widely but the result aimed at is the same. There has been a wonderful advance in field methods in recent years in the development of aerial photographic surveying and its adaptation to the science of mapping. This is particularly true with regard to the use of oblique photography, for in this branch of the work Canada has been a pioneer and has devised methods



Aerial Attack on Forest Pests—Specially equipped aeroplane spreading insecticides over a spruce forest in the Maritime Provinces in an experiment to discover a method of controlling the spruce budworm.

LAUNCH AERIAL ATTACK ON FOREST PESTS IN CANADA

(Continued from page 1)

forest areas. Series of carefully selected plots in infested timber, varying from eight hundred feet to two miles in length and from two hundred feet to a quarter of a mile in width, were treated with the poisoned dust in different degrees of concentration. The defoliation which occurs on these treated plots will be compared with that which occurs on selected untreated check areas in the surrounding forest.

This experiment aims at attacking one of the greatest enemies of the forest from a new direction and it offers practically the only hope of controlling spruce budworm outbreaks by any direct means. Since almost every detail of the work is new, as applied to our forest conditions, it is too much to hope that complete success will be obtained in one season. Preliminary reports received from the Cape Breton area indicate that large numbers of the caterpillars have been killed by the treatment; it is, therefore, confidently expected that marked progress will result from this year's experiment and that this method of control can be developed eventually to provide an effective weapon against this destructive insect.

which have been adopted in other parts of the world.

In the actual compilation of the map accuracy must also be safeguarded in every way possible compatible with the despatch aimed at in getting out the map sheet. When there is doubt regarding the accuracy of any information to be presented, the ultimate authority for such information is consulted whenever possible.

The possibilities of error are considerable. That such errors are extremely few is evidence that the work of map-making has been built up on a sound basis. The original records of surveys, made by field officers of the Topographical Survey, consisting of many thousands of field books and plans, are filed in their registry and record office which is one of the largest of its kind in the Dominion. The maps are plotted, and the printing, lithography and distribution are carried on beneath the same roof at Ottawa.

Forest fires in Canada, the great majority of which were caused by carelessness, have burned annually, during the last six years, 1,600,000 acres of young growth of various ages, representing the annual increment on 25 million to 30 million acres.

CANADA'S RESOURCES IN GAME

(Continued from page 1)

of town dwellers with the great outdoors is really a benefit since it makes them conscious of the value of the woodlands.

The big game animals which may be taken in Canada are moose, caribou, deer, bighorn sheep, Rocky Mountain goat, bear, grizzly bear, and lynx. Moose, deer, and bear are the chief animals hunted in the Maritimes, in Quebec and Ontario, and in the Prairie Provinces, and in most of them caribou may also be hunted in season. In the Prairie Provinces and British Columbia buffalo and antelope are protected at all seasons and this is the case in regard to elk or wapiti, except in certain localities. There is an open season for bighorn sheep and mountain goat in Alberta and British Columbia.

In addition to the big game the game birds which may be shot are duck, brant, goose, woodcock, Wilson's snipe, rail, ptarmigan, prairie chicken, ruffed grouse, and Hungarian partridge.

The enactment and administration of laws respecting big game come within the purview of the provinces and as changes may be made upon comparatively short notice, hunters from a distance intending to hunt in a particular locality will naturally communicate with the game department of the province in which they are interested, and with the railways and other transportation companies. Additional information will be gladly furnished upon application to the Department of the Interior, Ottawa.

VISITORS AND RESOURCES

Canada's resources have been brought to the attention of the world during the summer of 1927 by a number of celebrations, conventions, and congresses held in different parts of the Dominion. Not the least important of these events have been occasioned by the visits of Their Royal Highnesses the Prince of Wales and Prince George, and of Rt. Hon. Stanley Baldwin, Prime Minister of Great Britain. These personages with their parties arrived early in August and later in the same month a party, numbering about one hundred, of members of the British Newspaper Society reached Canada and are now spending six weeks in viewing the country from coast to coast.

HOW GREAT SLAVE LAKE RECEIVED ITS NAME

Geographic Board of Canada Explains Origin of Names of Prominent Geographical Features

How is it that in a country like Canada, where slavery has never been an institution, the word "slave" should enter into the names of prominent geographical features, such as, Great Slave lake, Slave river, and Lesser Slave lake?

A statement, furnished by the Geographic Board of Canada, throws an interesting sidelight on the history of the Northwest and upon Indian customs. Indian place-names, it points out, may refer to physical characteristics of the place, to incidents in the history of the tribe, or to associations of a tribe with a region. Examples may be seen in Saskatchewan river (swift flowing), Battle river (place of numerous battles), and Ottawa river (river frequented by the Ottawa tribe). Another point is that Indian tribes generally had two names—the name they gave themselves, and the name given them by their enemies—and in many cases the names which have been used by the white man have been "enemy" names. This accounts for the very uncomplimentary names which some Indian tribes bear. The record then proceeds to the effect that Great and Lesser Slave lakes and Slave river were named from a tribe of Indians which once dwelt in that region. These Indians called themselves *Etchareottine* which means "the people dwelling in the shelter of the (Rocky) mountains". In contradistinction to other northern Indians who were caribou eaters and travelled widely in pursuit of game, the *Etchareottines* were fish eaters and kept to the lakes.

When the more warlike Crees went on the warpath against the tribes on the Peace river they came from the south in canoes to Lesser Slave lake, and leaving their canoes there, proceeded overland. It is therefore readily to be understood how war parties of Crees, finding that the lake-dwelling Indians did not possess their own war-like attributes and ideas, should show their contempt by bestowing on the lake-dwellers the epithet "awonak" or "slaves".

The first white man to visit Great Slave lake was Samuel Hearne who reached the southeastern portion of the lake in 1772. He did not meet any Slave Indians and the name he applied to the lake was "Athapusco", meaning, possibly, the lake of the Athapascans. The name is not known today, old Indians referring to the lake as "big lake". It is to Peter Pond that we owe the present name. On his maps, 1790, we find the names "Iotchinine", another form of *Etchareottine*, "Great Slave", and "Slave".

Lesser Slave lake is mentioned by Sir Alexander Mackenzie who learned of the lake in 1792 from Indian hunters, the latter stating that it was called Slave lake by the Crees after its original inhabitants.

The direct revenues received by Dominion and Provincial Governments from the forests in the form of rentals, royalties, stumpage charges, etc., amount to \$15,000,000 annually. In Europe it has been found that increased expenditure on modern protective methods has always been followed by a much more than proportionate increase in revenues.

NATURAL RESOURCES CANADA

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1927 EXPEDITION COMPLETES SEASON'S WORK IN EASTERN ARCTIC

ENCOURAGING REPORT ON ESKIMOS HEALTH

Dr. Livingstone Returns From Year Spent
Among Natives on Baffin Island

Baffin island, although not as pleasant a place of residence for white men as more southern latitudes, is nevertheless capable of sustaining a vigorous and contented native population. This is an essential point in the report of Dr. L. D. Livingstone who has just returned from fifteen months duty as medical officer in the Canadian Arctic archipelago. Dr. Livingstone who was a member of the staff of each annual expedition to the Canadian Arctic from 1922 to 1926, examining the natives at the different ports of call, remained in the North at the conclusion of the 1926 patrol and spent the winter of 1926-27 and the spring and summer of this year in a detailed inspection of the natives in the interior whom it had not been possible to see on his previous annual visits.

During the early winter of 1926-27 Dr. Livingstone made his base at Pangnirtung, on Cumberland gulf, and one of his first duties was to deal with an epidemic of chicken-pox. The post and the surrounding district were quarantined for six weeks and the outbreak was stamped out without loss of life. In the beginning of February, 1927, Dr. Livingstone began his patrol work and in the two long trips undertaken, which covered a combined distance of nearly 2,200 miles, about twenty-five native villages were visited. The estimated population of these is placed at 1,000. On these trips Dr. Livingstone found the health of the natives good and a plentiful supply of seals and other wild life upon which the Eskimos depend for food and clothing. Of the six cases which he treated, two only were of a serious character.

The first of Dr. Livingstone's remarkable medical inspection patrols was begun on February 14 and lasted 51 days and was done in company with two officers of the Royal Canadian Mounted Police and native drivers. The party crossed the upper end of Cumberland gulf and followed the eastern coast line to cape Haven and into Frobisher bay; then made their way overland to Lake Harbour, the site of the new post on Hudson strait. From this point the party progressed westward along the coast for about 130 miles and then began the return journey. The travellers moved northward to Amadjuak lake and, following its southern shore for a distance, struck a new route, by way of an uncharted river, to Pangnirtung.

(Continued on page 2)

Notwithstanding Adverse Ice and Weather Conditions SS. "Beothic" But Little Retarded—New Post Established

The 1927 patrol of the Canadian Arctic archipelago, carried out by the Department of the Interior, was made under most unusual ice and weather conditions, such as the oldest Arctic navigators now in service have seldom, if ever, experienced. In spite of this, the patrol of the

easterly winds packed the ice in dense masses along the east coast and in the bays and inlets which precluded its drifting out into the middle of Davis strait. In spite of these things, however, the cruise was completed within schedule time.



Canada's 1927 Arctic Expedition—All hands assist in getting things in order at the newly established post at Lake Harbour, Baffin island. The framework of the building has been erected and the workers are busily arranging the supplies.

islands, the revictualling of the posts, and the establishment of a new post were successfully carried out; the only part of the program which could not be completed was the proposed visit to the Canadian Government cache on Melville island, which visit was rendered impossible by the complete closing of Barrow strait by ice. The Eskimos at the posts and villages visited were in good health and that this was the general situation was shown by the reports of resident officers. Hunting, it was found, had been good in the year since the previous inspection and the natives were generally well supplied with food and clothing. As upon the inspection trips of the past two years Mr. George P. Mackenzie, of the North West Territories and Yukon Branch was Officer in Charge.

The unusual weather conditions referred to were continual fogs—there being only a few fine days in the fifty-one occupied by the voyage—and the prevalence of easterly winds and gales instead of northwest winds which are usual during the summer. The fogs made navigation very difficult, especially in that part of the cruise in which the ship was north of the magnetic pole. Here the navigators had to find their way by judgment born of experience. Moreover

The ss. *Beothic* carrying the expedition left North Sydney, Nova Scotia, on July 16, and the run to Godhavn, Greenland, was uneventful, except that, owing to constant fog, navigating had to be done by dead reckoning. July 23, on which date the *Beothic* reached Godhavn was a perfect Arctic summer day, one of the few on the trip. The Officer in Charge disembarked immediately upon the anchor being dropped and paid his official visit to Governor Rosendahl, with whom he discussed a number of matters which had arisen since the visit of 1926. At the same time the scientists, with the permission of the Governor, went on shore to make collections and take pictures. The Governor and Mrs. Rosendahl, with Dr. Porsild, director of the scientific station, dined on the *Beothic* with Mr. Mackenzie and the officers of the expedition. Later, practically all the inhabitants of Godhavn were invited on board and shown moving pictures of previous expeditions and of Canadian scenes. To carry out this feature of the visit, which was greatly appreciated by the Greenlanders, it was necessary on account of numbers to show the pictures twice; the first audience was composed of women and children.

(Continued on page 3)

REMARKABLE PATROLS BY MOUNTED POLICE

Thousands of Miles Covered by Men
Stationed at Posts in Arctic

The ss. *Beothic* which recently returned from the annual Government patrol of the eastern Arctic brought with her a number of members of the Royal Canadian Mounted Police who had completed a two-year tour of duty at the various detachments in that region. She also brought the reports of the winter's work done in that part of the Canadian Arctic archipelago. These islands were traversed by numerous patrols, and some remarkable journeys were made. In general, regions which the ordinary reader regards as the goal of carefully organized exploring journeys, are regularly visited by the Mounted Police in the way of ordinary duty. Three of the journeys undertaken are of special interest.

Staff-Sergeant Joy, the non-commissioned officer in charge of the northernmost detachment—that at Bache Peninsula, on the eastern shore of Ellesmere island, approximately eleven degrees from the Pole—made a remarkable patrol to King Christian island, in the course of which he visited the islands of Axel Heiberg, Amund Ringnes, Ellef Ringnes, Cornwall, and Graham. This group of islands lies west of Ellesmere island. Access to them by water is exceedingly difficult, but Staff-Sergeant Joy, making Bache Peninsula his base, and working westward across Ellesmere island to Bay fiord, traversed the region accompanied for the greater part of the journey by two Eskimos. He left the detachment on March 26, 1927, and returned on May 18, having travelled 1,320 miles in 54 days; the mode of travel was of course by dog sleds. The usual interruptions by blizzards were experienced, and during the last few days the wayfarers, who were passing over mountainous country, were hampered by fog and deep soft snow.

Two points about this very long patrol were the quantities of game met with and a discovery of coal. Over 250 muskox were seen on the route, and the indications are that they are plentiful elsewhere; the caribou also seem to be becoming more numerous, and other species of game were observed. On Bay fiord Staff-Sergeant Joy noticed a seam of shale-coal forty or more feet thick above the ice-foot.

Corporal H. P. Friel, in charge of the police detachment at Pangnirtung, made

(Continued on page 2)

BUFFALO RUGS AS SOUVENIRS OF CANADA

Their Royal Highnesses and Premier Baldwin Carried Home Interesting Mementoes

Among the most interesting souvenirs of Canada carried back to England by the Prince of Wales, Prince George and Premier Baldwin were three magnificent buffalo robes from the National Buffalo Park at Wainwright, Alberta. The robes, which were mounted as floor rugs, were each superb specimens of their kind and were presented to the distinguished visitors during their visit to Calgary by the Hon. Charles Stewart, Minister of the Interior, whose department is charged with the administration of the national herds in Alberta and the Far North. As an expression of the spirit of the Canadian West probably no more appropriate or interesting gifts could have been chosen. In the early days of exploration and pioneer settlement of the prairies the buffalo played an indispensable part. The romance of its tragic disappearance, and of its rescue when on the verge of extinction, through the efforts of the Government, form a story probably unequalled in the history of any other of the great quadrupeds. It is not the least gratifying feature of the success attending the development of the national herds that the buffalo robe, which is unsurpassed among pelts for combined size, durability and beauty, is once more becoming available in limited numbers.

ALBERTA'S RANCHING DAYS ARE RECALLED

Geographic Board of Canada Indicates Origin of Certain Place-names

Early ranching days in Alberta are recalled by such place-names as DeWinton, Mitford, Staveley, and Stimson. According to the Geographic Board of Canada the village of DeWinton is named after General DeWinton, at one time secretary to the Marquis of Lorne, Governor General, who organized the DeWinton Ranch Company.

Mitford village was named in 1889 after Mrs. Percy Mitford, sister of the first Earl of Eglington. Mrs. Mitford was financially interested in a ranch in the vicinity with Lady Adela Rous, daughter of the Earl of Stradbroke and wife of Lt. Thos. Belhaven Henry Cochrane, R.N., son of Admiral Sir Thomas Cochrane. Lady Adela Cochrane was for a time postmistress at Mitford.

The town of Staveley is named after Alex. Staveley Hill, an English member of Parliament, who organized the Oxley ranch in 1882 and who related his ranching experience in "From Home to Home" published in 1885.

Stimson creek commemorates Major Fred Stimson, for many years resident manager of Bar-U ranch (North West Cattle Company).

Arctic bred Eskimo dogs are so valuable that they may be exported from the Canadian Arctic archipelago only for specific purposes and with the permission of the Commissioner of the North West Territories.



Encouraging Report on Eskimo Conditions—A rough stretch crossed on Dr. Livingstone's medical patrol along the east coast of Baffin island. Sixteen of the seventeen dogs in Dr. Livingstone's team may be seen in the above picture which was taken on the journey from Pangnirtung to Pond Inlet.

ENCOURAGING REPORT ON ESKIMOS HEALTH

(Continued from page 1)

reducing the time set for the journey by several days. The post was reached on April 5; about eleven hundred miles had been covered, and seventeen native settlements visited.

On April 25 Dr. Livingstone accompanied only by a native driver began a patrol northward along the east coast of Baffin island. It was concluded at Pond Inlet on June 5 and the distance covered is estimated at 1,028 miles. Heavy falls of new snow retarded the progress of the patrol and at one time the party was snowed in at the mouth of Scott inlet for three days during which three dogs were lost. As the patrol neared the end of its journey the coast was found to be badly charted and three days were lost in ascending an arm of the sea which was mistaken for Pond inlet.

Last winter, according to Dr. Livingstone, was a comparatively mild one on Baffin island with the temperature very seldom falling lower than 45° below zero. Travelling conditions were good and during his patrol little difficulty was found in securing seal meat. Dr. Livingstone lived on seal meat during the patrols carrying biscuits, flour, rolled oats, tea, sugar, and evaporated fruits to supplement it. Coal oil was used for cooking and seal oil for heating. Snow houses were used during the winter patrol and a double silk tent in spring.

The need of educating the Eskimos in wild life protection, in the practice of economy, and in methods of hygiene is strongly urged by Dr. Livingstone. The habit of putting aside supplies of food and other necessities for seasons of scarcity and a knowledge of sanitation would greatly improve general conditions among the Eskimos of the eastern Arctic.

REMARKABLE PATROLS BY MOUNTED POLICE

(Continued from page 1)

an important patrol in company with Dr. L. D. Livingstone, the Government Medical Officer wintering on Baffin island, and Constable T. A. Tredgold. This patrol occupied 51 days from February 14 to April 5, 1927, and covered approximately 1,300 miles. The route was around the southern corner of Baffin island to Lake Harbour, thence up the coast to Amadjuak, returning overland to Cumberland sound and Pangnirtung. The last part of the patrol was over ground unknown to white men until a year or two ago. During the journey Dr. Livingstone made a medical inspection of the

natives, a census was taken and information was compiled on Eskimo living conditions.

Constable J. Murray of the Pond Inlet detachment made a 900-mile patrol in the northern part of Baffin island in connection with the death at Home bay, near cape Kater, of Mr. Hector Pitchforth, a trader representing the Sabelum Trading Company. Constable Murray left on March 23, 1927, to make an investigation and convey the remains to Pond Inlet for burial. The entire journey, which lasted till May 14, a period of 53 days, was very difficult, the ice being exceedingly rough, the snow deep and soft, and storms frequent and severe. The investigation showed that the trader's death, which occurred at New Year 1927, was from natural causes.



Police Patrols in the Arctic Archipelago—Photograph of two R.C.M.P. officers taken on board ss. *Beothic*. Left: Staff-Sergt. Joy who made a 1,320-mile patrol from the farthest north post, Bache Peninsula. Right: Sergt. Wight in charge of the new post at Lake Harbour, Baffin island.

So far as is known the name "Waterton" was given to the lovely sheets of water in Waterton Lakes national park, Alberta, by Lieut. T. Blakiston, a member of the famous Palliser Expedition of 1857, in honour of Charles Waterton, 1782-1865, the English naturalist and

COLLECTED MANY NEW BOTANICAL SPECIMENS

Over 4,000 Sheets of Flowering Plants and Ferns Secured in Canadian Arctic

Dr. M. O. Malte, Chief Botanist of the National Museum, Department of Mines, accompanied the 1927 expedition to the Canadian Arctic archipelago and reports exceptionally good botanical results. Through the courtesy of the Officer in Charge of the expedition opportunities were given to utilize every available moment for the collection of plants at the various posts visited. The almost ideal facilities for the preparation and drying of the material collected, provided by officers of the *Beothic*, made it possible to preserve an unusually large number of specimens. In the short space of seventy-seven hours of actual collecting at a dozen ports of call, more than four thousand herbarium sheets of well preserved flowering plants and ferns were secured.

The actual number of different species collected cannot be given at present, as many of them require critical study before their proper classification can be determined. It may be noted, however, that the collections include a comparatively large number of new and interesting plant-geographical records. Using H. G. Simmons' "Survey of the Phytogeography of the Arctic American Archipelago," published in 1913 as a work of reference, sixty-two species of flowering plants and ferns had so far been recorded from Devon island. Less than ten hours collecting in the immediate vicinity of the Mounted Police post at Dundas Harbour yielded 28 additional species, making a total of 90 species now known from Devon island, some of which had not previously been recorded from north of Baffin island.

On Baffin island, supposed to be comparatively well known botanically, not less than 25 additional species were discovered, several of which had not previously been found north of Hudson strait.

Generally speaking, the discoveries made will add materially to the knowledge of the flora of Arctic Canada and will throw much new light on the geographical distribution of the species occurring on the Arctic islands, as well as on the relationship between the flora of the Canadian Arctic archipelago and that of the mainland of the North American continent.

traveller, then widely known for his researches into the sources of Indian poisons and his ornithological work. Mr. Waterton, indeed, might be said to have been one of the pioneers in wild life conservation, for he expended a large part of his fortune in creating a sanctuary for his feathered friends.

In the fourth quarter of the last century people, when they desired to be uncomplimentary, called Canada a "wooden country" referring of course to the widespread use of wood in the construction of buildings, bridges, sidewalks, pavements, etc. Today statesmen and economists, with far different feelings, describe the Dominion as the "softwoods storehouse of the Empire" and urge all Canadians from patriotic as well as from business motives to conserve and utilize this great resource with which a benevolent Providence has endowed the land.

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1927 EXPEDITION COMPLETES SEASON'S WORK IN EASTERN ARCTIC

(Continued from page 1)

and the second of men. These annual visits are looked forward to by both residents and visitors as they enable those in charge to secure information and compare notes as to conditions which affect both Arctic Canada and Greenland.

Godhavn was left the same evening and Baffin bay crossed in the vicinity of latitude 74°, normal ice conditions prevailing. The first post at which it was desired to call was Pond Inlet which lies about thirty-six miles up a sheet of water of the same name. No difficulty was found until within about twenty miles of the post when the winter ice was encountered in solid formation from shore to shore. The ship's head was therefore turned northward and Dundas Harbour on Devon island was reached on July 27. Here in addition to the usual supplies some materials were left to enable the police to complete repairs to post buildings which had been unroofed about a month previously in one of the worst storms ever known in the region. Passing on to Craig Harbour, on the south-east shore of Ellesmere island, it was found that the ice again blocked the way. Moving up northward into Smith sound, Etah, on the Greenland coast, was first touched at and then the dash was made across the sound to Bache Peninsula. This was the most anxious piece of navigation on the voyage. Owing to the heavy east wind the ice was crowded back into the fiords and inlets. No difficulty was encountered, as is usually the case, in entering Buchanan bay. The post at Bache Peninsula was reached without undue delay, although there was considerable ice in the upper end of the bay. The landing of supplies was completed as quickly as possible and after a stay of six hours the *Beothic* was again under steam, headed for Rice strait which connects Buchanan bay with Smith sound. The wind continuing from the east and the fog being dense it was feared that the ice from Kane basin would close the lower part of the bay. It was an exciting passage but the speed of the *Beothic* and good seamanship won, and the ship, after several anxious hours was again in Smith sound, steaming southward.



1. BARROW ST. 2. CORNWALLIS I. 3. BEECHEY I.
4. SOMERSET I. 5. PORT LEOPOLD 6. LANCASTER SD
7. ARCTIC B. 8. KING CHRISTIAN I.

Map of a portion of the eastern Arctic showing points visited by the Dominion Government's 1927 expedition. The patrols of the Medical Officer and Mounted Police may also be followed on this map.

Craig Harbour was again approached and this time the shifting of the ice enabled a landing to be effected and the necessary work done. After calling at Dundas Harbour a course was laid westward along Lancaster sound with the object of passing through Barrow strait into Melville sound. This is the neck of the famous "northwest passage" which is rarely traversed by navigators. Beechey island, which lies off the southwest end of Devon island and whereon stands the cenotaph to Sir John Franklin and the men of his expedition, was reached on August 5. The prevailing east wind packed the ice into the narrowest part of Barrow strait between Somerset and Cornwallis islands, in a solid mass. For three days the *Beothic* patrolled up and down in front of this ice barrier, the navigators looking for a lane opening to the westward, and hoping for a northwest wind to drive the ice out of the strait. Continual fogs, and the fact that the ship was now north of the magnetic pole made navigation difficult but the attempt was kept up until it was seen to be impracticable without a longer delay than the duties of the expedition permitted.

The ship's head was then turned to the east and after touching at Port Leopold and Arctic Bay she proceeded to Pond Inlet. This post is usually easily approached late in the summer but this year the swinging back and forth of the ice pack, held there by contrary winds, made landing difficult and the unloading of supplies was not completed until August 17. Dr. Livingstone, who had spent the winter on Baffin island and who had made a medical inspection trip from Pangnirtung to this post, was here taken on board.

The *Beothic* on her way down the coast touched at Clyde inlet and, proceeding southward, experienced no difficulty in getting up Cumberland gulf to Pangnirtung. Here Dr. L. J. Weeks and Mr. M. H. Haycock of the Geological Survey who had spent a year on the island were taken on board, and the ship sailed for Lake Harbour on the south

shore of Baffin island, where it had been decided to establish a new post. Lake Harbour was reached on August 25 and supplies and material for the buildings immediately landed. Three days were spent here, the ship's company assisting the police in getting their buildings forward, and then the *Beothic* crossed over to Wakeham Bay on the south side of Hudson strait to transfer one police officer and several Eskimo families from Lake Harbour to this point. She then passed on to Port Burwell where supplies for the police detachment located there were landed. From Port Burwell the run to North Sydney was uneventful and the latter port was reached on September 4, after a cruise of 51 days.

In addition to the Officer in Charge the following were members of the expedition: Captain L. D. Morin, Ice Pilot; Dr. F. H. Stringer, Medical Officer; Mr. W. Q. Ketchum, Secretary to the Officer in Charge. Dr. M. O. Malte represented the National Museum of Canada, and Dr. F. G. Banting and Mr. A. Y. Jackson, artist, both of Toronto, accompanied the expedition as guests. Royal Canadian Mounted Police officers who went north this year were: Inspector C. E. Wilcox, Sgt. Wight, Corp. Petty, and Constables Anstead, Makinson, Margetts, Dersch, and Cox. The following police officers returned with the expedition: Staff Sgt. Joy, Corp. Friel, and Constables Bain, Timbury, Tutin, and Tredgold. Captain E. Falk was Master of the Ship, and Mr. E. J. Mead, wireless operator.

Among the seven beautiful reservations set aside by the Government of Canada in the Rocky mountains, there is none lovelier than Waterton Lakes national park. This charming recreational area lies on the eastern slope of the Rockies where these mountains approach the International Boundary. The park forms a rough square with a long L-shaped section added to the east, the whole having an area of about 220 square miles.

GROWTH OF MINING IN SLOCAN DISTRICT, B.C.*

Has Been Heavy Producer of Silver, Lead, and Zinc Since 1891

The Slocan is part of the West Kootenay district of southeastern British Columbia and lies within the Selkirk Mountain system. The most important section lies between Slocan and Kootenay lakes and extends for a few miles on each side of the Nakusp-Kaslo branch of the Canadian Pacific railway. Sandon is the principal mining centre of this section but important properties are also located near Silverton and New Denver on Slocan lake and in the vicinity of Three Forks, Rambler, Zinc-ton, Retallack, and Zwicky stations along the line of the railway.

The Slocan's fame as a producer of rich silver-lead ores followed the discovery in 1891 of an outcrop of the Payne vein. From 1892 to 1926 inclusive the Slocan district has produced ore to the value of about \$68,000,000 of which \$34,000,000 is credited to silver, \$22,500,000 to lead, and \$10,500,000 to zinc. This total production has been furnished by some 270 properties, of which 16 have each produced from \$1,000,000 to \$10,000,000 worth of ore, and upwards. Sixty-three properties shipped ore in 1919 when production was valued at \$4,500,000. The greatest production was during the years 1912 to 1919 inclusive, when values of annual shipments averaged about \$3,339,000. This period included that of the war, during which development and production in the Slocan was encouraged by the urgent demand and high market price of metals. Following the war, production fell off greatly, although the average has been considerably greater than in pre-war years. In 1926 ore valued at \$2,201,091 was produced of which \$670,660 was credited to silver, \$541,960 to lead, \$985,061 to zinc, and \$3,410 to gold. Aside from these metals the Slocan has also made small shipments of copper, antimony, and manganese ores.

The future of the Slocan is largely dependent upon the deeper developments of its silver-lead and zinc deposits, as the surface of the more productive sections has been carefully prospected and most of the outercapping ore bodies worked out. The success which has attended developments on the larger properties to depths in some cases of well over 1,000 feet below the outcrop, has been encouraging and has done much to discredit the saying in the district that the ore "did not go down." The tendency for the silver-lead ore bodies to become "zincy" with depth is no longer the handicap to development that it was in the earlier days, as zinc ores can now be successfully treated and command a good market price. Their development has also led to the discovery of other silver-lead shoots which more surficial explorations would not have disclosed.

Notwithstanding these advantages the Slocan is handicapped by the peculiar nature of its ore shoots which, though generally rich, are not large and are commonly separated from each other by long intervals of lean or barren vein matter. This condition necessitates a great deal of dead work and it is difficult to keep reserves much in advance of production.

* Prepared at the direction of Dr. Charles Camsell, Deputy Minister of Mines, by Dr. C. E. Cairnes, Geological Survey.

TRANSFER ESKIMOS TO INTERIOR DEPARTMENT

Affairs of Natives of Canadian Arctic Now
Under Commissioner of North West
Territories

An important change has been made in regard to the Eskimo inhabitants of Canada, namely, their transfer from the care of the Superintendent General of Indian Affairs, under whom they were placed in 1924, to that of the Commissioner of the North West Territories, Department of the Interior. The Commissioner is responsible for the general management of affairs in the Canadian Arctic, where all our Eskimos live. Annual expeditions are sent out to the eastern archipelago, and many officers are stationed in the North who can handle Eskimo matters in conjunction with their other duties. A number of these officers speak the Eskimo language, and are familiar with conditions of life and travel. The protection of the wild life of the Arctic with which the welfare of the Eskimos is inseparably bound up is a direct responsibility of the Commissioner, and it is with the view of benefiting the natives that an investigation is being made of the possibility of introducing reindeer into northern Canada. The transfer was made by Order in Council on August 31, and is already in effect.

INVESTIGATE GEOLOGY OF BAFFIN ISLAND

Officers of Department of Mines Return
From Year Spent in Arctic Region

Dr. Ludlow J. Weeks of the Geological Survey, Department of Mines, and an assistant, Mr. Maurice H. Haycock, of Wolfville, Nova Scotia, accompanied the 1926 Canadian Arctic expedition as far as Baffin island, and returned on this year's patrol ship. After establishing headquarters at Pangnirtung in 1926 several trips were made around the head of Cumberland gulf and a plane-table map of Pangnirtung fiord was completed before the 1926-27 winter set in.

During the winter and the following spring approximately 2,300 miles were covered by sled and dog team. By this means the party was able to map the northern part of Cumberland gulf, and in the spring, to investigate the geology and mineral possibilities of the region. Early in May the party moved to Nettilling fiord and after the break-up, in July, a start was made on the journey by water to Nettilling lake. Weather conditions were very adverse and many delays were encountered. The party succeeded, however, in carrying a traverse from Nettilling fiord through a chain of small lakes to Nettilling lake and along the south shore of the latter. On August 17 the party left for Pangnirtung, having been recruited to meet the patrol ship *Beothic*. Pangnirtung was reached without mishap on the night of the 21st, the *Beothic* having arrived earlier the same day.

The region examined is entirely underlain by a complex of ancient granites, recrystallized limestone and other sediments, cut by dykes and other masses of younger basic rocks. Several deposits of graphite are known and evidences were discovered of pyrite and copper

PRINCE ALBERT NATIONAL PARK

Aerial Inspection Made of New Recreational Area in Saskatchewan—Excellent Bathing Beaches

Saskatchewan, which has long been noted as possessing in its immense, arable areas one of the Dominion's most extensive working fields is now to have a worthy playing field, or recreation ground. This is Prince Albert national park situated in the middle of the province, being about forty miles north of the city from which it takes its name.

side in the northeastern corner of the park. The water of the lakes is as clear as crystal, without trace of alkali, and, as the names of some of them indicate, is the home of valuable species of fish. The miles of sandy beaches indicate that there is room enough for summer resort and cottage and camping sites to meet the need of the people of Saskatchewan.



Prince Albert National Park—The beach at Crean lake, one of the larger bodies of water in the new recreational area. The superb bathing beaches and the opportunities for canoeing are outstanding attractions of the park.

This recreational area was established last spring by Hon. Charles Stewart, Minister of the Interior. It is somewhat irregular in shape, extending about forty miles from north to south and about the same distance from east to west, in the widest part; it covers an area of 1,377 square miles.

The Commissioner of Canadian National Parks, Mr. J. B. Harkin, who made an extended inspection tour of western parks during the past summer, spent considerable time in travelling through and over this park with the object of laying out the program of improvements necessary to make the playground as accessible and useful as possible to the people of Saskatchewan. The method of travel was by motor car from Prince Albert to Waskesiu summer resort at the east end of Waskesiu lake, and thence by canoe through a chain of rivers and lakes to Little Trout lake in the northwest corner of the park. From this point an extended aeroplane flight was made over the northern part of the park including a circuit of three of the largest lakes there. This survey showed the possibilities of the area reserved. The feature that will appeal most strongly to visitors is the immense extent of beautiful sandy bathing beaches along the shores of the lakes, little and big, which occupy such a large proportion of the area. There are three main lakes in this chain, lake Waskesiu about seventeen or eighteen miles long, Little Trout lake, and Crean (formerly Big Trout) lake, slightly smaller. Montreal lake and Bittern lake are a little to one

sulphides; but none of the deposits yet known appear to be large or of much commercial importance.

The big game animals having their habitat in the park, which now becomes a sanctuary, include caribou, moose, elk, Virginia deer, and bear. Regulated fishing is permitted in national parks and will here form a powerful attraction, the principal species being lake trout, white fish, and pike.

As some of the mountain parks are famous as being the starting places for mountain climbing trips, so Prince Albert park will be the rendezvous of those who want to explore the illimitable northland. Canoe journeys may be begun here which by means of a series of waterways will lead on to the great Churchill river and Hudson bay. Or a deviation may be made to the right hand or the left to bring the adventurer out in northern Manitoba or northern Alberta. It is no exaggeration to say that a thousand different canoe trips, short and long, some following the routes of the great explorers and others possessing all the fascination of the unknown, may be started from the park.

Part of Prince Albert park was formerly within the boundaries of the Sturgeon national forest which accounts for the summer resort already located at the eastern end of lake Waskesiu. Despite the present limited facilities for travel a growing use is being made of the recreational advantages of this area and this indicates that when the plans for development are completed Prince Albert national park will take a prominent place among Canada's tourist resorts.

In spite of the increasing use of substitutes for wood the people of the world never before used as much of that material every week as at the present time. The modern steel ocean passenger ship

RAINBOW TROUT IN PRINCE EDWARD ISLAND

Introduction of Spring-Spawning Trout Will Considerably Extend Angling Season

Angling for speckled trout during the early spring and summer has been for years one of the principal tourist attractions of Prince Edward Island. However the fact that the speckled trout spawns in the fall has kept the trout waters of the province closed to anglers during one of the most favoured angling seasons of the year. Realizing what a valuable asset it would be to Prince Edward Island to have its trout angling season extended for several weeks, an experimental planting of the fry of rainbow trout, a spring-spawning species, was made in Pisiquid or Keefe lake in 1925 and another in 1926, with the result that angling for this gamiest of game fish has been introduced into Prince Edward Island.

The plantings were made by the Department of Marine and Fisheries and the fry were hatched in the hatchery at Kelly Pond near Southport, Prince Edward Island. Reports received from departmental officers indicate that the experiment has been highly successful, that the fish have attained a remarkable growth during the two years since the first distribution, and that they have retained all the food and game qualities for which the species is noted. The Inspector of Fisheries for the province reports that up to the end of July this season approximately 100 rainbow trout have been caught in Pisiquid lake aggregating a total weight of upwards of 200 pounds. He states they are equal in quality to the best sea trout of the Maritime Provinces and are much harder to land than the native speckled trout of either the freshwater or sea-run strains. The new denizens of Pisiquid lake rise freely and are wonderful fighters. One angler had 45 rise to the fly and hooked 11 in an afternoon's fishing. The largest trout caught was a four-pounder, and the biggest catch was 11 in two hours fishing. Six of the latter averaged over three pounds in weight.

Since rainbow trout is indigenous to the western slopes of the Rocky mountains and Coast ranges, as well as to some waters in northern Alberta, the introduction of this fish into the waters of Prince Edward Island has been watched with the greatest interest. The advisability of introducing rainbow trout into other prescribed areas in the province that are more or less self contained and not connected with any extensive system of speckled trout waters is receiving consideration. Certain lakes and ponds in which speckled trout angling has declined or which have become depleted are being examined as locations for future introductions. Depleted areas are preferred as the presence of spring- and fall-spawning fish in the same waters is undesirable. The results that are apparent in Pisiquid or Keefe lake have been attained by distributing fish in the fry stage.

has much more wood in its decks and fittings than would have built an entire wooden ship of sixty or seventy years ago. It was in all seriousness and without any idea of a play on words that a noted Canadian conservationist pointed out recently that in spite of all modern inventions man is still surrounded by wood in every stage of his progress from the cradle to the grave.

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CHECK RAVAGES OF LARCH SAW- FLY IN CANADA

INTRODUCED PARASITES WAGE WINNING BATTLE

Control of Pest Means Considerable Reduction in Losses to Dominion's Forests

Protection against fire is the aspect of forest conservation most frequently brought to the attention of the Canadian public because, since nearly all forest fires are caused by human agency, the educating of people in regard to carefulness is the best means of checking this evil. The forest has, however, other enemies—diseases and insects—and against these the officers of the Departments of Agriculture and the Interior and other forest authorities and protective agencies wage ceaseless warfare.

The attacks of different insects are combated in different ways, one of which is the sending forth of opposing insect armies to kill the pest. In other words, the forest conservationist secures a number of parasites which prey on the injurious insects. These parasites are released in the midst of the infested area, and each species has its characteristic way of dealing with the host insect against which it is sent. The value of this method is attested by the results already secured in combating the ravages of a forest insect pest called the larch saw-fly.

About thirty years ago the larch sawfly suddenly assumed epidemic proportions in the Maritime Provinces of Canada and in Maine, U.S.A., and in the elapsed interval it has swept westward over the northern half of the continent as far as the east slope of the Rockies, where it is still destructively at work on the last remaining mature stands of its host tree, the eastern larch or tamarack.

Over this vast section of North America, so general and yet so thorough has been the work of the insect that only an occasional larch over four inches in diameter escaped. The smaller trees, however, remained unharmed. Everywhere, therefore, fine young oncoming stands of this useful species are in evidence today and the hope of bringing back the larch lies in preventing a recurrence of the saw-fly scourge.

In the year 1913 through the efforts of the Dominion Entomologist (the late Dr. C. Gordon Hewitt), the valuable saw-fly parasite *Mesoleius tenthredinis*

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CANADA, THE OUT-OF-DOORS LAND

Winter Season Provides Unlimited Opportunities for Healthful and Enjoyable Open-air Recreation

Winter or summer, Canada is the land of the great out-of-doors. The advent of the season of ice and snow changes the form but does not decrease the extent of open-air activities. In the industrial life of the country certain operations are undertaken which can only be carried on during this period of the year. Each autumn thousands of

But it is the opportunity which the season provides for vigorous outdoor recreation that is gaining fame for our Canadian winter. Canada during this period is the ideal country for the enjoyment of every form of winter pastime and this fact is becoming better realized every year. Carnivals, curling bon-spiels, ski-jumping competitions, hockey



Canada, The Out-of-Doors Land—The Dominion's Governor General is an enthusiastic follower of outdoor sport. In the above photograph, taken on the occasion of the final match for the Governor General's Curling Trophy at Rideau Hall, Ottawa, last winter, he is seen outside the curling rink. Reading from left to right, the group includes Captain Jervis, A.D.C.; Major General W. E. Hodges, Ottawa; His Excellency Lord Willingdon; and Mr. A. S. Findlay, Montreal. Major General Hodgins and Mr. Findlay are President and Past President respectively of the Canadian Branch of the Royal Caledonian Curling Club.

workers enter our forests to prepare the harvest of timber and pulpwood for the succeeding activities in sawmill and pulp and paper factory. The freighting of supplies to new points of settlement and development in northern Canada is largely done during the winter season, and many other operations in the economic life of the Dominion take place at this time of the year.

matches, and other events and contests are spreading the gospel of health and enjoyment to be gained in Canada's great out-of-doors.

Tobogganing and snow-shoeing, now among the leading winter sports, were at a time early in the history of the Dominion the chief means of winter travel. However, as has often been

(Continued on page 3)

CANADA HOLDS LEADING PLACE IN POWER WORLD

HAS FIFTEEN GREAT ELECTRIC SYSTEMS

Study of Development of Hydro Power in 1926 Reveals Interesting Facts

It has become the custom in recent years to rate as "great electric power systems" those public utility systems, under one financial control and management, which have a total output of 100,000,000 kilowatt-hours, or more, per annum. Such systems are usually completely interconnected and may contain several power stations.

A recent study of such systems in Canada for the calendar year 1926 shows that the Dominion now possesses 15 systems of that class and that the total output of these 15 systems, excluding duplication, represents about 82 per cent of the total output of the public utility or central station systems of Canada. The systems referred to in order of their total output during the year 1926 are:—

1. Hydro Electric Power Commission of Ontario,
2. Shawinigan Water & Power Co., Quebec,
3. Montreal Light, Heat & Power Consolidated, Quebec,
4. Canadian Niagara Power Co., Ontario,
5. Laurentide Power Co., Quebec,
6. West Kootenay Power Co., British Columbia,
7. British Columbia Electric Railway Co.,
8. City of Winnipeg Hydro Electric System, Manitoba,
9. Winnipeg Electric Co., Manitoba,
10. Canada Northern Power Corporation, Ontario and Quebec,
11. Dominion Power and Transmission Co., Ontario,
12. Ottawa & Hull Power & Transmission Co., Quebec,
13. Duke-Price Power Co., Quebec,
14. Kaminitiquia Power Co., Ontario,
15. Southern Canada Power Co., Quebec.

The annual output of each of these systems exceeds, and in many cases is a large multiple of, a hundred million kilowatt-hours per annum, and the first four systems in the list far exceed a thousand million kilowatt hours each.

The total output for 1926, excluding duplication due to purchased power, was nearly 10,000 million kilowatt-hours. The total installed plant was over 3,300,000 horse-power of which over 96 per cent was water-power, and the mean load factor or degree of utilization was 60 per cent.

Modern practice in power supply is increasingly towards large interconnected systems, with their advantages of efficiency, economy, and reliability,

(Continued on page 2)

RECORDING VARIATIONS OF COMPASS NEEDLE

Movements of Instrument Closely Studied
—Importance of This Service

"True as the needle to the Pole" has been for hundreds of years an aphorism, the aptness of which has ever been taken for granted, but in face of the observations of science that axiom has to be revised. The truth is, the needle does not point to the Pole. Not only that, it points in different directions at different places, and behaves in such an altogether inconstant manner that the riddle of its vagaries is one of the present-day problems of the scientist.

Every schoolboy knows that the world itself acts as a magnet, and that its magnetic poles do not coincide with the geographic, or true North and South Poles. The compass needle is attracted to the magnetic poles, and consequently does not point true north and south, but more or less to the east or west at different places. This deviation from a line drawn through the geographic poles is called the "declination" of the compass. The north magnetic pole, by the way, is on the west side of Boothia peninsula in the District of Franklin in the Northwest Territories of Canada, and the south magnetic pole is in South Victoria Land, south from New Zealand.

But the declination of the needle is only one of several movements of the compass. This declination, or deviation from the true north and south, does not remain the same from year to year. This yearly change is known as the "secular variation" or "march" of the compass. By way of example, the same compass which today at certain places on lake Nipigon, Ontario, points almost due north, if removed to Halifax, Nova Scotia, would point practically northwest by north, and at Lethbridge, Alberta, northeast by north. At Aklavik in the Mackenzie River delta it would point practically northeast. Again, the compass at Fort Churchill, Manitoba, two centuries ago pointed twenty-one degrees west of north; following that it swung gradually over and reached a maximum of twelve degrees east of north about seventy years ago, and it is now swinging westward again. The same sort of change is going on everywhere, rapidly in some places and more slowly in others, now to the east and again to the west.

This change in the compass has a most important bearing on daily life and must be taken into consideration. For instance, suppose that somewhere in Eastern Canada there is a doubt about the location of the line-fence between two farms, and at a certain point at the edge of the highway there is a landmark from which the boundary line, as surveyed by the compass seventy-five years ago, runs north magnetically. Should a layman endeavour to re-locate the line by compass today, he would find that apparently the old boundary diverged to the east and that there was consequently a considerable distance between the two lines at the north end. By referring the matter to a surveyor, however, it would be pointed out that during the interval since the previous survey the compass had marched so many degrees to the westward, and that the old line was correctly placed.

It is not known as yet what causes this secular variation, or yearly change of declination at various places. As has been pointed out, the compass marches



Canada's Great Power Systems—Development at Isle Maligne on the Saugenay river, Quebec, owned by the Duke-Price Power Company. The capacity of this plant is 540,000 horsepower. Electrical energy from this development is delivered to pulp and paper plants in the district and to the newly established aluminium industry at Arvida. Power from the Isle Maligne plant is also purchased by the Shawinigan Water and Power Company and delivered over a transmission line 136 miles long to Quebec city and district.

CANADA HOLDS LEADING PLACE IN POWER WORLD

(Continued from page 1)

and the above is obviously a very satisfactory showing. The question naturally presents itself, how does this compare with other countries? There is only one other country in the same class in this respect and that is our immediate neighbour. The United States, with a population twelve times as great as that of Canada, has naturally a much greater number of systems of the class under consideration, but it can be shown by statistics that Canada has a large lead both as to the number of such systems in proportion to population and as to the output from such systems per head of total population.

CHECK RAVAGES OF LARCH SAW-FLY IN CANADA

(Continued from page 1)

was introduced into Manitoba from England. This parasite works by laying its eggs on the injurious insect, so that the young parasites, as soon as hatched, make a meal of the body of their host. This means that in the next insect generation the number of harmful ones will be decreased whereas the number of parasites will be increased; and it is reasonable to expect that the losses to forests in this country from larch sawfly ravages will be reduced considerably through the distribution of this parasite in infested areas.

Collections of saw-fly cocoons have been made on several occasions since 1913 but it was not until 1918 that observations indicated a noticeable increase in the number of the parasites.

or moves to the westward for many years, then turns backward and marches to the eastward; then reverses again and so on, but the peculiar feature is that no one can foretell what the movement will be in so many years. The attempt to unravel this fascinating problem and the recording of compass readings all over Canada constitute one of the many duties of the Department of the Interior.

Maps showing the variation of the compass are issued every five years. Copies are available at a nominal price and may be had upon application to the Topographical Survey, Department of the Interior, Ottawa.

COMPLETE HIGHWAY TO MOUNTAIN SUMMIT

Mount Revelstoke National Park, Beautiful Mountain Top Reserve, Opened to Motorists

A national park, as yet little known but of which more will soon be heard, as the result of the completion of the Mount Revelstoke Highway, is the beautiful mountain top reserve, known as Mount Revelstoke park. As long ago as 1912 the Government set aside a reserve of about 100 square miles comprising the park-like tableland on the summit of the peak and a part of the wild, glacier-hung Clachnacudainn range. Surveys for a motor highway from Revelstoke were almost immediately begun and work was commenced the next year on the building of the road. The outbreak of the war, however, delayed operations and it was only with the present season that national park engineers were able to complete the undertaking.

While the new road will be officially named The Mount Revelstoke Highway, locally the road is known as the Royal Highway, because it bears so many mementoes of royal visits. In 1915 Prince Arthur of Connaught went over the portion then completed and planted a stone to mark what was then the end of construction. In 1916 his father, the Duke of Connaught, then Governor General, with Princess Patricia also inspected the highway and marked their visit and the progress of the work in a similar way. In the year 1921 His Royal Highness the Prince of Wales motored up about 16 miles and at what was then the end of construction unveiled a tablet dedicating the national park to public use. When the Prince this year again visited Revelstoke the road was practically complete and it was felt that it was appropriate that this return visit should be made the occasion for the public opening of the road. A small amount of surfacing, however, still remained to be done. This is now practically completed and it is expected that next season will see hundreds of motor visitors from the Pacific Coast at this charming reserve in the clouds.

The new road will be one of the finest drives in the mountains, climbing in a great spiral of twenty miles up the slopes of splendid mount Revelstoke. As the elevation increases the panorama becomes superb. To the east are the snow-covered summits of the Selkirks, to the west the long line of the Gold range. Through the valley, here flat as a floor, the green Illecillewaet and the broad Columbia are seen winding to mingle their waters about one mile from the mountain's base.

The new highway will also play its part in the winter sports for which the Mount Revelstoke park is so widely known. In winter the park will, of course, be closed to motor travel and the highway may be utilized for a twenty-mile ski run which, it is said, will surpass the famous Cresta run in Switzerland. The park's ski-jump, on the lower slopes of the mountains, is not only one of the most picturesque but probably the fastest on the continent and holds the record for six world championships. Ski-ing experts, in fact, declare the Mount Revelstoke region equal to the best in Norway and its unique attractions in the way of winter sport must eventually make the park one of the finest winter resorts of the continent.

CANADA'S AGRICULTURAL JUBILEE

Canada's Agricultural Jubilee is to be celebrated at the Royal Winter Fair at Toronto from November 16 to 24. Arrangements for the form which this celebration of Canada's basic industry will take are being directed by Hon. W. R. Motherwell, Minister of Agriculture for Canada. Each of the Provincial Governments has agreed to collaborate.

The progress of agriculture in the Dominion in the past sixty years has been one of the most striking features in the development of the country. In 1867, the year which witnessed Confederation, the wheat production was about 15,000,000 bushels. For 1927 the total yield is estimated at 459,000,000 bushels. The total value of the field crops sixty years ago was about \$100,000,000. In 1927 it is expected the field crops of the Dominion will have a total value of over \$1,120,000,000.

In the short period of three-score years Canada has emerged from an insignificant position in world production to that of the largest exporter of wheat, to the second largest producer of wheat, the second largest producer of oats, and to a significant place in the production of dairy products, fruits, and several other foodstuffs.

In spite of the tremendous advances made in other directions since Confederation agriculture remains the chief of the Dominion's industries, and the opportunities Canada has to offer are more attractive now than ever before.

At the Royal Winter Fair the advance of agriculture will be shown both from federal and provincial viewpoints. Every phase of its wide activities will be displayed to illustrate the value of the great heritage Canada has in her extensive areas of fertile lands.

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CANADA, THE OUT-OF-DOORS LAND

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noted before, the work of one generation is the play of another, and so in the twentieth century the toboggan and the snowshoe carry increasing numbers far afield in search of health and pleasure.

The growth of urban population, bringing with it closer application to indoor pursuits has made the need for outdoor exercise of outstanding importance and to the effort to meet this need is due the development of the play idea as embodied in skating, skiing, curling, ice-boating, and hockey, which now supplement the older forms of sport. Most of these sports may be adapted to almost any time of life. From childhood to old age persons of both sexes may enjoy one or more of these forms of recreation. Hockey, the national winter sport, is probably the most strenuous, although skiing, tobogganing, skating, and snow-shoeing may be followed as vigorously or as leisurely as the devotee desires. Curling is probably the least strenuous of Canada's winter sports. Its appeal and its physical demands are similar to those of golf or lawn bowling.

One very important point is that the general effect of witnessing Canadian winter sports is to induce the spectator to participate. The proof of this is given by the hundreds of amateur hockey clubs, the thousands of ski enthusiasts, curlers, skaters, snow-shoers and tobogganists. The universality of the appeal is shown by the circumstance that there are possibly just as many skiers over forty as under that age, and that all the less strenuous forms of winter recreation draw into them leaders in commerce, the learned professions, and the State.

Many parts of Canada offer other forms of recreation which are characteristically their own. Ice-boating and dog-team driving are among these. The former demands rather unusual conditions such as great smooth surfaces of ice, and where these occur the sport provides thrills comparable only to those of flying. At one time dog-team racing was enjoyed only on the outskirts of settlement where the dog train formed an important part of the means of winter transportation. In recent years the sport has been introduced wherever winter carnivals are held and it is rapidly gaining favour among outdoor enthusiasts. Golf, tennis, and other sum-

HEALTH OF CANADA'S IMMIGRANTS*

Important Work of Branch of Dominion Department of Health—Extension of Service

The most vital natural resource of a country is its human capital; in the final analysis a nation's stability and greatness hinges on its percentage possession of healthy, happy, industrious citizens.

Canada is as yet but thinly populated; vast stretches of her territory still await the coming of hardy, virile manhood. Realizing this, it is not to be wondered at that since Confederation immigration has been one of the important problems with which the successive governments, charged with the administration of the country's affairs, have had to deal. Canada's experience through more than half a century has shown that if reasonable success is to be achieved by immigrants and their families, and a vigorous parental stock for future generations of Canadians safeguarded, it is of primary importance that incoming settlers shall be fit both physically and mentally.

Since the creation of the Federal Department of Health in 1917, under whose administration the medical inspection of immigrants was placed, increasing stress has been laid upon physical and mental ratings, and the standard of selection has been and is being steadily raised. As a result of the immigration medical officers' certification, immigrants who on arrival are found to be physically or mentally defective may be refused permission to land. Others who have been successful in passing the medical line inspection, but who after a few weeks or months in Canada, suffer a mental or physical breakdown of which the symptoms were not apparent at the time of arrival, and who thereby may become public charges, are subject to deportation. Such an outcome may be a serious matter to the persons concerned; having given up home and employment in their native land, their re-establishment on return may prove difficult. Prospective immigrants in recent years have been recommended therefore before taking active steps towards emigrating to this country, to present themselves for thorough medical examination to a doctor in their home district, selected from a roster approved by the Department of Health of Canada. Only in the case of unaccompanied women, children's immigration schemes, and Government-assisted passages to Canada, however, has such medical examination been com-

mer sports are enjoyed throughout the winter months on the islands and mainland of southwestern British Columbia, where the mildness of the climate and the proximity of high mountain ranges make it possible to enjoy both winter and summer forms of open-air sport.

Outdoor recreation where crisp air, brilliant sunshine, and beautiful natural scenery are combined promotes an uplifting of spirit, a renewal of health, and a stimulation of mind, all of which are very necessary in this strenuous yet housed-in age. Canada offers opportunities for participation in enjoyable forms of open air exercise in winter which are equalled in few parts of the world. The Dominion is the ideal winter sportland, offering to all, young and old, rich and poor, health and enjoyment in the ozone-laden air of our snowclad prairies, forests, and hills.

pulsory in the past. In these relatively few cases the results which such examination has produced are very marked. A comparison of the official figures shows that for 1926, the last complete period for which figures are available, out of approximately 95,000 immigrants arriving in Canada who did not undergo compulsory examination before embarkation, the medical line inspection at the ports of entry, which is necessarily cursory and not adequate for the detection of certain types of disease, eliminated only twenty-eight or .03 per cent of mental defectives and forty-one or .04 per cent under the head of loathsome and communicable-dangerous diseases; on the other hand, of the 20,000 assisted immigrants who underwent compulsory examination before embarkation, one hundred and fifty or .75 per cent of the former group and one hundred and ninety-five or .97 per cent of the latter group were certified as unfit and prohibited from entry into Canada. All things being equal there is no particular reason why the percentage should be lower in the one case than in the other.

A further important development in the elimination of the unfit is about to be undertaken. Following approval by the Canadian Government, it has been decided that every prospective immigrant to Canada shall be examined by a medical officer as to his or her mental and physical fitness before permission to emigrate to this country is granted. For this purpose a number of Canadian medical examiners have been appointed, who will be stationed at key cities in Great Britain, Ireland, and on the continent of Europe. Under this policy, while admission to Canada will continue to be determined finally at the Canadian ports of arrival, no person will be permitted by our Department of Immigration to emigrate to this country until he or she has been examined and passed by an officer of the Immigration Medical Service, Department of Health. A maximum degree of weeding-out of the physically and mentally unfit will thereby be attained, thus reducing to a minimum the possibility of rejection on this side. It is expected that this new policy will be in operation by the time the flow of emigration to Canada sets in next spring.

* Prepared under the direction of Dr. J. A. Amyot, Deputy Minister, Department of Health, by Dr. J. D. Page, Chief, Medical Immigration Division.

FORT CHAMBLY, QUEBEC

Fort Chamby, twenty miles southwest of Montreal on a conspicuous headland of the Richelieu river, is a most picturesque and interesting ruin. The first Fort Chamby was erected by the French in 1666 and the building of the present structure was begun in 1709. In 1851 the fort was abandoned as a military post and in 1921 was placed under the care of the Canadian National Parks Branch of the Department of the Interior to be preserved as a valuable memorial of the early military history of Canada. It is near one of Quebec's main highways and is visited by many motorists every year.

IMPORTANCE OF NOVA SCOTIA SALT DEPOSITS*

Discovery of Rock Salt Has Direct Bearing on Maritime Provinces Fisheries

In 1917 rock salt was discovered at Malagash, Nova Scotia, and the first production from these deposits was made two years later. The importance of this discovery to the fisheries of the Maritime Provinces was early recognized and steps were taken to produce grades of salt suitable for the curing and packing of fish. The development of these deposits has progressed steadily from a production of 174 tons in 1919 to over 8,000 tons in 1926.

The salt from these deposits is won by mining, the salt being encountered at a depth of only 85 feet from the surface, after which it is crushed and ground into suitable grades.

In the preserving of fish for the market, salt has long played an important part, but it is only within recent years that any systematic study of the effect of salt on the tissue of fish has been made. The results of these studies have been of the greatest interest and benefit to the fishery trade and have enabled the producers of salted fish to prepare better products both as to appearance and grade than was possible under the old hit-and-miss methods. It has been found that salt produced by solar evaporation from sea water contained a certain bacterial organism which produced a red discoloration on the fish, especially on cod fish, but this organism is not believed to be present in salt produced from bedded salt deposits. The rate of penetration of salt into the tissues of the fish has also been extensively studied and the results have shown that the faster the penetration the better the quality of the product. The rate of penetration has been found to depend to a great extent on the purity of the salt; the purer the salt the faster the penetration. The presence in the salt of calcium and magnesium compounds is found to be highly detrimental and tends to make the fish white and opaque.

For many years large quantities of salt have been imported for use in the fisheries of the Maritime Provinces. Much of this came from Turk's island in the West Indies and from the Spanish provinces bordering on the Mediterranean sea. The product from both these localities is produced by solar evaporation from sea water and in consequence trouble has frequently been encountered by Canadian and European producers of salted fish due to the red discoloration developing on their products.

Since the fisheries industry of the Maritime Provinces of Canada has for many years been one of the mainstays of these provinces and one of increasing importance, the discovery of the Malagash deposits, producing as they do a product so essential to such an industry, should prove of great benefit, and their more extensive development will be of the greatest assistance.

* Prepared at the direction of Dr. Charles Camsell, Deputy Minister, Department of Mines, By Mr. L. H. Cole, Mines Branch, Ottawa.

INTENSIVE PATROL OF MUSK-OX SANCTUARY

Experienced Explorer Leaves in January for Area East of Great Slave Lake

To make an intensive examination and patrol of the area east of Great Slave lake recently set aside as a sanctuary for musk-ox and other wild life, the Department of the Interior is sending out an experienced explorer having an intimate knowledge of the animal life of the region. Early in January Mr. W. H. B. Hoare, of the North West Territories and Yukon Branch will leave Ottawa for Edmonton on the first leg of his journey to the 15,000-square mile reserve lying on the Thelon and Hanbury rivers in the Northwest Territories. From Edmonton Mr. Hoare will continue by rail to Waterways, the end of steel, and there he will begin an 800-mile journey by dog team to the proposed location of his base camp on the site of Fort Reliance, about 35 miles southwest of the westernmost corner of the sanctuary. About a month will be occupied in the trip to Fort Reliance and it is not expected that Mr. Hoare will return south before the end of 1928 or the spring of 1929.

Accurate information has long been recognized as the basis of efficient and economical administration, and it is for this reason that the Department of the Interior is having careful examinations made of this part of Canada's vast northland before undertaking the expenditures necessary to conserve and develop the resources therein. During his patrol Mr. Hoare will take a census of the wild animals in the reserve, indicating as far as possible the inroads being made by wolves and other predatory animals. He will also report on what measures should be taken to protect the big game therein, particularly the musk-ox and the caribou; on the number of wardens that will be required to properly patrol the area; and on the best locations for wardens' cabins. There are no permanent residents, either native or white, in the sanctuary, and the area is, as far as is known, seldom visited, nevertheless observations will be made of the number, if any, of Eskimos and Indians visiting the area and the seasons at which they appear.

For the purpose of equipping this patrol, six Eskimo sled dogs were brought from Pond Inlet, Baffin island, by the 1927 Canadian Arctic Expedition. Sled dogs from the eastern Arctic are noted for their strength and endurance and on that account are rated highly by travellers in the Far North. A thick growth of fur close to the skin protects the Eskimo dog from the cold winds of the Arctic regions and makes him most suitable for work in the open expanses of the great Northern Plains.

On the journey in Mr. Hoare will be joined by a game warden at Fort Smith, the local administrative headquarters of the Northwest Territories. The warden will accompany Mr. Hoare during the patrol and if it is necessary will bring a team of dogs to help in moving the equipment to Fort Reliance. Should the return trip, late in 1928 or early in 1929, be made via Fort Smith the Eskimo dogs will be left there for the use of the wardens on patrol work.



Intensive Patrol of Musk-ox Sanctuary—Photograph of the team of six Eskimo dogs brought from Pond Inlet, Baffin island, for use during the patrol of the area east of Great Slave lake. As names are essential in handling and driving Eskimo dogs, the team have been named as follows, reading from left to right: Amagok (wolf), Mammiena (rascal), Silver, Kappienia (rogue), Nannuk (polar bear), and Cinnamon.

THE APPLE INDUSTRY IN CANADA*

Dominion's Leading Position in Apple Culture—Optimistic Outlook for the Future

From the very earliest times the apple has been Canada's most important commercial fruit; its increase both as to acreage and crop returns was rapid and steady up to the beginning of this century, and today, after two decades of un settlement and arrested development of the industry, it is again resuming its forward march.

Most botanists are of the opinion that the apple is not a native of North America and that the "wild" apples which the pioneer settlers in some localities, such as along the St. Lawrence, found growing amid the forest trees on their homesteads, were the descendants of trees imported still earlier. Whether the apple be indigenous or introduced, one thing is certain, namely, that in many parts of Canada it finds an ideal environment and produces fruit unequalled by any other country in the world where apples are grown. This is proved by the fact that for many years about one-third of Canada's crop has been exported to other countries, and also by the circumstance that three times at the Imperial Fruit Show in England the McIntosh Red variety has been declared the finest dessert apple in the British Empire.

Opinions differ as to which province belongs the honor of first growing apples—both Quebec and Nova Scotia claiming the distinction—but it is certain that for nearly three centuries apples have been growing in both provinces. It is believed the Fameuse or Snow apple originated in Quebec and it is known that when John McIntosh settled near Iroquois, Ontario, on the St. Lawrence river in 1796, he found the ancestor of the present McIntosh Red trees growing wild on his bush farm.

Apples are grown commercially in all the eastern provinces and on the Pacific slope, the chief commercial orcharding districts being in Nova Scotia, Ontario and British Columbia. Although apples in commercial quantities have not been produced in the Prairie Provinces—Manitoba, Saskatchewan, and Alberta—

* Prepared under the direction of Dr. J. H. Grisdale, Deputy Minister of Agriculture, by Mr. G. E. McIntosh, Commissioner, Fruit Branch, Ottawa.

considerable attention is being given to their culture, especially in Manitoba. Several promising hardy varieties have been developed at Dominion experimental farms and from propagation of these good results are anticipated.

The causes of the set-back in the past two decades, already referred to, are very complicated but the fortunate circumstance is that the way to renewed expansion has been already entered upon. One difficulty in apple growing has been that this tree is so hardy that where the orchard is a sideline to the main farming operations it is apt to be neglected in the rush of other work and, therefore, much of the fruit offered locally is not of high quality but this grade of fruit is rapidly decreasing in quantity because of greater attention to cultivation. Again, far too many kinds of apples have been grown, with the result that there are over a hundred varieties produced in commercial quantities in Canada, whereas the public need would be met by twelve to fifteen, and the work of selecting and grading by the packer would thereby be rendered much easier. One of the reasons for optimism lies in the fact that the present trend of the industry is towards specialization, and this has been particularly noticeable in the last few years, during which orchards in bearing all over Canada have been grafted to fewer and more desirable varieties. A result of Canada's suitability for apple culture and of the additional care given orchards has been that 80 per cent of the crop is of commercial quality. This is a much higher percentage than that secured in any other country.

Apple orcharding occupies a most important place in Canadian agriculture as the following facts indicate: Over 200,000 acres of land are devoted to the production of apples, the value of these orchards is estimated at \$120,000,000, and the annual crop ranges from 3,250,000 to 4,500,000 barrels. The crop contributes directly and indirectly approximately \$3,000,000 to the railway earnings of Canada and makes possible or adds materially to the success of such subsidiary industries as canneries, evaporators, cider and vinegar factories, coop-

HEAVY TOURIST TRAVEL TO NATIONAL PARKS

Large Number of Distinguished Visitors to Canada's Mountain Playgrounds

Tourist travel to the national parks during the season that is just closing has been exceptionally heavy and the number of distinguished visitors the largest in the history of the parks. The most notable of these were, of course, Their Royal Highnesses, the Prince of Wales and Prince George, who with Premier and Mrs. Baldwin and the other members of the Royal party spent several days informally at Banff and Lake Louise resting after their strenuous tour across Canada. Earlier in the year Banff was honoured by a visit from Their Excellencies, Lord and Lady Willingdon, who spent a few days there on their first trip to the West. This autumn Their Excellencies returned for a couple of weeks' holiday in Jasper park, enjoying with their party the fishing, golf, and motor-ing of that superb Alpine playground.

The number of private parties, many of which travelled in special trains, was also unusually large, and included a special party of delegates to the Pan-Pacific Relations Congress at Honolulu among whom were Sir Frederick Whyte, Viscount Castlereagh, Mr. Lionel Curtis, famous founder of the Round Table, Mr. Malcolm MacDonald, the Hon. William Astor, son of Lord and Lady Astor, the Hon. Hugh Wyndham, Sir Arthur and Lady Currie and a number of other prominent citizens of the Empire. Other visitors were the British Editors' party of about 120, a party of delegates from the World's Poultry Congress comprising over 100, and 300 delegates to the Triennial Congress of Mining and Metallurgy. Special parties from the United States included 400 members of the Investment Bankers' Association, travelling in four special trains; the New Outlook Magazine party numbering 200; and delegates to the Convention of Real Estate Men, who toured in two special trains. Several large special parties came also from Ontario and Quebec, including one of about 150 visitors who travelled under the auspices of Laval University, Quebec.

erages, stave mills, box factories, and factories for the manufacture of tools, implements, chemicals, and wrapping paper required in producing and marketing the fruit.

The apple brings with it important benefits in addition to those of a commercial nature. In the early days of settlement it was found that its introduction to any new locality was always followed by an improvement in the health of the inhabitants, and its keeping qualities are such that it may be used in the fresh state every month in the year. These are some of the reasons why the apple has come to be called the King of Fruits, and why also its production promises to become an even more important feature of Canadian agriculture than it has been in the past sixty years.

Alfalfa can be grown over the widest range of climatic conditions of any legume yet grown in Canada. It is now being produced in every province from the Atlantic to the Pacific.

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PAVE JASPER PARK MOTOR ROAD WITH BITUMINOUS SANDS

USE MATERIAL FROM
ALBERTA DEPOSITS

Practical Test of Tar Sands Made Through
Co-operation of Departments of the
Interior and Mines

The commercial utilization of the tar sand deposits of the McMurray area has been materially advanced by the surfacing with this natural asphalt of roadways and walks in Jasper national park, Alberta. This practical test—the first on a commercial scale—was made possible by the co-operation of the Canadian National Parks Branch of the Department of the Interior and the Mines Branch of the Department of Mines.

The section of road surfaced extends from Jasper townsite to Jasper Lodge, the tourist hotel of the Canadian National Railways, a distance of nearly two and three-quarter miles. Traffic is fairly heavy and is equivalent to at least 500 motor vehicles per day. Climatic conditions are marked by wide range in temperature and are therefore typical of conditions which prevail in Western Canada. The bituminous sand mixture was laid directly on the old gravel road which was equivalent to a fairly good macadam. The thickness of wearing surface is approximately two inches.

Following the completion of the highway itself a considerable additional yardage was laid at the request of officials of the Canadian National Railways. This included the approaches to the Jasper Lodge garage, and walks and roadways communicating with the various bungalows connected with the Lodge. The total area laid was equivalent to approximately 40,000 square yards of 2-inch compacted surface. This work was begun in 1926 and finished in the summer of 1927 so that part of the pavement has been in use for over a year.

In carrying out its part of the work the Mines Branch opened up a quarry at McMurray, looked after the transportation of material, and operated a heating and mixing plant for the manipulation of the sand. At the quarry, the overburden, consisting of 12 to 15 feet of loose material, was first removed and the bituminous sand itself was then readily broken down by the use of slow explosives. The material was loaded on barges and towed up Clearwater river to the terminus of the Alberta and Great Waterways railway, at Waterways; loaded by hand into mine cars,

(Continued on page 4)

PLANTING TREES ON PRAIRIE FARMS

Beneficial Effects of Shelterbelts on Agricultural Production in Western Canada

The planting of trees on prairie farms in Western Canada is having an appreciably beneficial effect on the quality and variety of agricultural production in that part of the Dominion. The large and growing annual distribution of planting material made from the nursery stations of the Department of the Interior at Indian Head and Sutherland.

been made of 12,528 proposed new plantations, and trees to meet the requirements of these new applicants will be sent out next spring.

To ensure success in the establishment of shelterbelts active and helpful control is exercised by the Forest Service. From early June until freeze-up a corps of nine experienced field inspectors



Planting Trees on Prairie Farms—This photograph of a Saskatchewan farm shows the striking contrast between this home with its shelter of trees and the surrounding bare prairie. These plantations were set out at different times between 1916 and 1922 and the photograph shows the growth made in from three to nine years.

Saskatchewan, is gradually changing the general appearance of the prairies in the provinces of Manitoba, Saskatchewan, and Alberta, and the development of shelterbelts is being followed by the setting out of apple and small fruit orchards, gardens of fine vegetables and by the further beautification of prairie homes with shrubs, flower beds, and extensive lawns.

A recent report from the Tree Planting Division, Forest Service, Department of the Interior, indicates the growing success of tree planting and the new avenues of development opened up as a result of this work. Further and further afield word of the success of the work is being carried and requests for stock are now received from practically every part of the prairies. At present the demand for trees is greater than it has been at any time in the twenty-seven years since the inauguration of free tree distribution, and in 1927 these shipments were the largest so far with a total of 7,430,000 broadleaf seedlings and cuttings. These were sent out to over 11,000 farmers under the Department's co-operative plan. There is every prospect that the 1927 figures will be exceeded in 1928 as inspections have

travel continuously inspecting proposed new plantations, advising farmers who are actually planting, and taking careful census of the plantations of the previous years. Incidentally they take note of the effect of the plantations on the social and economic life of the settler. The outstanding point has been the encouragement given to the growing of fruits and to the building up of really attractive home surroundings by the planting of ornamental shrubs and flowers and the setting out of lawns.

Twenty years ago the number of prairie farms with really first-class vegetable gardens was small while only rarely was the growing of fruits attempted. Reports to the end of August, 1927, covering 3,812 farms visited show that of this number 3,411 had good vegetable gardens; 1,258 were growing small fruits; 379 had ornamental shrubs; 265 were testing standard apples and crab apples; while 213 were growing plums.

Although the development of tree planting in the Prairie Provinces has been rapid in recent years, its rate of progress during the few years immediately following its inauguration in 1901

(Continued on page 2)

CANADA STUDYING DEVELOPMENT OF COAL PROCESSING

PROGRESS IN GREAT BRITAIN AND GERMANY

Minister and Deputy Minister of Mines Gain Valuable Information During European Trip

So much has been written in recent months in the newspapers not only in this country but of Great Britain with regard to the virtues of the methods of treating coal by low temperature processes and the recovery of oils from coal that the Minister of Mines, Honourable Charles Stewart, considered it in the interests of this country to acquaint himself with the progress being made in Europe along these lines. In consequence, during the months of September and October, accompanied by his Deputy, Dr. Charles Camsell, he personally inspected a number of plants both in Germany and Great Britain in which work was being carried out in these subjects.

In Germany through the good offices of the German Foreign Office an itinerary was laid out for him by the Commissioner for Coal in that country, and low temperature plants were examined at Essen, Mulheim, Leopold, and Minna Anna, and a visit made to the coal liquefaction works being erected by the I. G. Farben Industrie at Leuna near Halle.

In Great Britain an itinerary was worked out for him by the British Fuel Research Board covering the more important developments in low temperature carbonization in that country. This included inspections of the Illingworth plant; the plants of the Low Temperature Distillation Company; the Midland Coal Products; Fusion Corporation; Maclaurin; Sensible Heat Distillation Company; Turner; and the Fuel Research Board plant at Greenwich.

In addition conferences were held with a number of other organizations and individuals developing low temperature methods of which there is record of about 200 different patents in Great Britain alone.

The conclusions reached with regard to the present status of low temperature carbonization is first of all that extraordinary interest is being shown in developing processes particularly in Great Britain and Germany, where in one case the production of a smokeless fuel is the great desideratum and in the other the maximum yield of oils and other by-products from the coal. Secondly, that while rapid progress is being

(Continued on page 3)

MAKE AERIAL SURVEY OF WOOD BUFFALO PARK

Southern Portion of Great Northern Reserve Photographed—Important Data Secured

Great expanses of grazing lands, numerous hitherto unknown lakes, and stretches of heavily wooded country were revealed by aerial photographs taken during the past season from planes engaged in a survey of the southern half of Wood Buffalo park near Fort Smith, Northwest Territories. The information made available by this aerial survey will prove of importance in studying the capability of this great range to provide feed, water, and shelter for the future development of the buffalo herds which now roam its expanse of 17,300 square miles. Owing to unfavourable flying conditions the entire reserve could not be photographed and only the southern portion was surveyed this year.

The Wood Buffalo park, which lies on each side of the boundary line between the Northwest Territories and the province of Alberta is administered by the North West Territories and Yukon Branch of the Department of the Interior, and at the request of this Branch, the survey work was undertaken by the Topographical Survey of the same Department in co-operation with the Royal Canadian Air Force of the Department of National Defence. The greatest dimensions of the park are approximately 175 miles north and south and 150 miles east and west. The nearest post is Fort Smith, N.W.T., just north of the territorial-provincial boundary. In the area occupied by the park the last remaining herds of wild wood buffalo were discovered many years ago and these are now estimated to have increased to about 1,500 animals. Since 1925 to this area have been brought the overflow from the herd in Buffalo national park, Wainwright—nearly 6,000 more—so that the total number, making allowance for natural increase, is now in the vicinity of 8,000.

The aerial survey of Wood Buffalo park, when completed, will be one of the largest yet undertaken and is the farthest north survey of its kind on this continent. The season's operations were carried out with two Viking seaplanes, each carrying a pilot, a photographer, and a surveyor-navigator. The home base of the planes was at Ladder lake, Saskatchewan, and they were flown to the local base at Chipewyan at the west end of lake Athabaska, a distance according to the water route followed of roundly 500 miles. The west end of lake Athabaska forms part of the eastern boundary of the park so that Chipewyan is situated virtually on the edge of the reserve.

Previous to the survey the great stretch of country lying between the Peace river and Great Slave lake, west of Slave river, which includes the major portion of the park, had to a large extent remained *terra incognita*. This was due to the fact that it is almost lacking in navigable rivers and much of it is timbered plain of little relief in which the ground observer can seldom get an extensive view. Only a few old Indian trails give access to the interior.

From an aeroplane at a height of 5,000 feet the country spreads out to a horizon sixty miles away with clear detail. The cameras have accurately



Aerial Survey of Wood Buffalo Park—Fort Smith, on the Slave river, local headquarters for Mackenzie District, Northwest Territories, photographed from the air. The administrative buildings are situated in the centre of the picture as indicated by the flagpole.

recorded all the water areas. The fall and winter range of the buffalo stands out clearly; the heavily wooded rolling country and the spring and summer feeding grounds are also recognizable on the photographic prints. A third class of country in which the swampy areas shade to the highlands is also shown. This country is nearly flat with low islands and on it drainage is poor and moss accumulates. Although such land does not furnish much pasture it serves the useful purposes of conserving the water supply and forming a natural fire-guard.

The examination of the photographs of the southern half of the park covered by the work of the past season reveals a great many previously unknown lakes, relieving any apprehension of water shortage. Valuable data on the situation as to pasture and road location may also be obtained to assist in the administration and development of the park.

Photographs taken at 5,000 feet are on too small a scale to show animals but the officers in charge of the ground control operations reported that they saw a number of buffalo which were in good condition and evidently thriving. This confirms the reports received from wardens by the North West Territories and Yukon Branch, which is in charge of the park, to the effect that the different herds and shipments were getting along peaceably together and that all were thriving.

YUKON RIVER NAVIGATION

The Yukon river is navigable for large steamers from its mouth to Whitehorse, Yukon Territory, Canada, a distance of about 2,000 miles. The only obstruction to navigation which steamers cannot overcome with their own power at all stages of water is at the Five-fingers rapids, so-called from five rocks which stand up out of the water like the fingertips of some giant hand. No difficulty is experienced at these rapids during the greater part of the season but at the period of extreme high water the fall, at one point, is just sufficient to lift the big stern wheel of an upward-bound steamer for a few seconds out of the water. That brief space of time is sufficient for a ship to lose headway and be carried downstream. To overcome this, when steam navigation was first undertaken on the river, an improvement was made by which a steel cable was attached to suitable ringbolts in rocks above and below the rapids and the cable itself allowed to lie slack in the water. When

PLANTING TREES ON PRAIRIE FARMS

(Continued from page 1)

was comparatively slow. Settlers and others were very skeptical as to the possibility of growing trees successfully on the prairies and although the trees were to be had free only 47 farmers could be induced to set out plantations, and the total number of trees distributed in that year was but 54,800. The success of these early plantations encouraged other farmers to take advantage of the opportunity to beautify and improve their homes, and ever since there has been a gradual increase in the demand for tree-planting stock.

Up to date the number of trees shipped from the Indian Head and Sutherland stations has reached 93,131,000 broadleaf seedlings and cuttings of maple, ash, caragana, poplar, and willow; all of these were furnished free of charge to those applicants who had ground in a satisfactory state of preparation. Of evergreens, 1,645,145, have been distributed. These were white spruce, Scotch pine, jack pine, and lodgepole pine. Only limited numbers of evergreens are grown and on that account a nominal charge of \$3 per hundred is made. Although the primary function of the nursery stations is to supply trees for farm shelterbelts and woodlots, nearly 1,000,000 evergreen seedlings and transplants were supplied for planting on various national forests under the Dominion Forest Service.

It is evident that in addition to beautifying the farm and thus greatly improving the environment of the prairie home, the establishment of shelterbelts directly benefits the farmer by raising the quality and increasing the quantity of the products of his farm. The results obtained from fruit growing are most encouraging. With the further development of shelterbelt planting and the production of hardier varieties of fruits by the institutions now carrying on that class of work, it is reasonable to expect that in the not far distant future almost every prairie farmer will be raising supplies of fruit for domestic use.

steamers bound up-stream reach the foot of the rapids the cable is taken on board and looped around a steam-driven capstan. As fast as the steamer pulls herself up river the slack or lower end of the cable is paid out overside into the water again. Once the critical point in the rapids is passed the cable is cast off into the river bed where it is immediately available for the next steamer bound up-stream.

PEACE RIVER WAS OLD INDIAN BOUNDARY LINE

Crees and Beaver Indians Made Treaty of Peace on Its Banks

The early history of the Peace River country in northern Alberta is recalled by facts connected with the origin of the name. According to the Geographic Board of Canada, Peace river has always been known to white men by its present name, which refers to the fact that the Cree and Beaver Indians made a treaty of peace on its banks. In his "Travels and Adventures," published in 1809, Alexander Henry, the Canadian fur-trader, mentions that on Churchill river in 1776 he met and traded with a band of Chipewyan Indians who informed him that there was at the farther end of lake Athabasca "a river called Peace river" which descended from the Rocky mountains. Among the early white men to reach "the river of Peace" was Henry's colleague, Peter Pond, who wintered in the region of lake Athabasca in 1778 and subsequent years. Pond had a fort on the Peace river, near its mouth, in 1786.

Neither Henry nor Pond give any explanation of the origin or meaning of the name, but on the map of Philip Turnor, of the Hudson's Bay Company, dated 1790, there is this inscription: "Beaver Indian river, by the Canadians called Peace river," while the land on both sides is designated "Beaver Indian country." Turnor's map would indicate that it was only traders from Canada who used the name Peace river, but the quotation given above from Alexander Henry, and the statement of Sir Alexander Mackenzie do not bear this out.

Mackenzie, in the account of his voyage to the Pacific in 1793, narrates that he entered the Peace river on October 12, and continues: "On the 13th at noon we came to the Peace point, from which, according to the report of my interpreter, the river derives its name; it was the spot where the Knisteneaux [Crees] and Beaver Indians settled their dispute . . . When this country was formerly invaded by the Knisteneaux, they found the Beaver Indians inhabiting the land about portage la Loche, and the adjoining tribe were those whom they called Slaves. They drove both these tribes before them; when the latter proceeded down the river from the lake of the Hills [lake Athabasca], in consequence of which, that part of it obtained the name of the Slave river. The former proceeded up the river; and when the Knisteneaux made peace with them, this place was settled to be the boundary."

Gold has been found in every province of Canada except Prince Edward Island. The first recorded discovery was made in Quebec in 1824 on the Gilbert river, 50 miles south of Quebec city. Placer mining operations commenced here in 1847 and intermittent operations have been carried on ever since. Placer discoveries were made in Ontario, in British Columbia, and in Yukon Territory at much later dates. Lode mining for gold began at Tangier river, Nova Scotia, in 1858. In 1926 the total production of gold in Canada was 1,729,000 ounces, valued at \$35,749,000. Approximately 85 per cent of this production was obtained from mines in northern Ontario, and 14 per cent from British Columbia.

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CANADA STUDYING DEVELOPMENT OF COAL PROCESSING

(Continued from page 1)

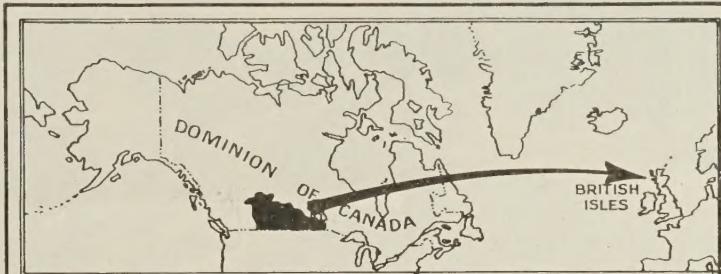
made in the development of methods of carbonization, and success in certain of the plants seems assured, none of these methods can yet be said to have been thoroughly proven to be commercially successful on a large scale, with the exception of a process which has been in operation in Germany on brown coals for several years and is used mainly for the production of wax. In addition, it is unlikely that any one system will ever be adopted as applicable to all coals and all conditions to the exclusion of all other systems. It is certain that the type of plant to be adopted in any particular case will depend on the object aimed at and the quality of the coal available. In other words, the problem of low temperature carbonization as applied to the Maritime Provinces will be different from that of Ontario and also from those of Saskatchewan and Alberta, owing to the different types of coal available and the different market conditions prevailing in each place.

As a result of these visits valuable information was gained and connections made that will permit officers of the Department to keep in close touch with the progress of developments.

Inquiry was also made into the status of the two methods of converting coal into oil, of which much has been heard recently, namely, the Bergius process of hydrogenation and the synthetic processes of Fischer in Germany and Patart in France. The former process is much further advanced than the latter and after sixteen years of experimental work and the expenditure of some millions of dollars it is now about to be applied in modified form on a commercial scale in a plant almost completed at Leuna. This plant proposes to use German brown coal, which it must be understood is very different to Canadian lignite, and when operating is expected to produce 100,000 tons of oil annually. Costs of production under the Bergius process are of course as yet unknown but it is estimated that from brown coal at \$2.50 per ton an oil similar to natural petroleum can be produced at about \$3 to \$3.25 per barrel. If these estimates of costs are correct the process has at present no possible commercial application on this continent where crude petroleum can be produced from wells and is selling at less than half that figure. Owing however to the fact

WHEAT

Canada's Golden Chain of Empire Trade



1897
All Products

\$69,500,000

1927
Wheat & Flour only

\$276,500,000

CANADA'S EXPORTS TO THE UNITED KINGDOM

N.R.I.S.

The vigorous impetus which Western development has lent to Canadian progress during the present century is pretty generally realized, but it is doubtful whether there is full appreciation of the no less striking manner in which prairie agriculture has likewise led the way in strengthening the economic bonds of Empire.

For twenty years prior to 1897 Canada's commerce with the Motherland was virtually stationary, barely holding its own. Its value in 1895 was less than it had been in 1875, two decades earlier.

Then commenced the amazingly rapid settlement of the Canadian prairies—the development of wheat-growing resources on a scale that was destined not merely to remould the business life of

the Dominion but to pour a torrent of new power into the sluggish channels of Empire trade. Within the past thirty years the commercial currents between Canada and the Mother Country have been revitalized and transformed. Today the United Kingdom's purchases of Canadian wheat and flour alone are many times greater in value than her total imports of Canadian products of all kinds in 1897.

Western Canada's wheat-growing resources, still far from having reached the limits of their productive capacity, have woven between the British Isles and the Dominion an economic bond of such power and permanence as only the most courageous vision could have imagined less than one generation ago.

that the Leuna plant will be operated in connection with a large fertilizer plant, from which very cheap hydrogen can be obtained, costs of production are expected to be below these figures. Control of the application of the Bergius process throughout the whole British Empire is in the hands of Sir Alfred Mond and associates.

The synthetic process of making oil from mixtures of carbon monoxide and water gas was seen in operation in the laboratory of the Kaiser Wilhelm Institute of Coal Research at Mulheim. This process is not so far advanced as the Bergius process and is still in the laboratory stage of development. Technically the process has been proven, but it is still a far cry to the time when it may be applied commercially. Both processes and especially the Bergius are, however, of such interest that the Department will and is in a position to keep in close touch with the progress of their development and in this respect the trip was especially valuable.

A special crate for shipping fish eggs has been developed by the Canadian Department of Marine and Fisheries. In this type of case salmon eggs have been shipped from the Maritime Provinces to British Columbia; from St. John, New Brunswick, to Dublin, Ireland; and from Vancouver, British Columbia, to Tokio, Japan. The eggs in these shipments hatched out practically as well as those hatched at points at which they were produced.

The records of the Dominion Water Power and Reclamation Service of the Department of the Interior show that a very satisfactory amount of new water-power development is now in hand and still more is in view for the future. It is estimated that 400,000 horse-power will be completed in 1927 and that the further work which is practically assured will aggregate some 1,900,000 horse-power in three or four years time.

The Late Percy Reid

By the death on November 13 of Mr. Percy Reid, Gold Commissioner of Yukon Territory, the Government Service of Canada lost a senior officer of outstanding ability, and one who had occupied many responsible posts both in Canada and abroad. Mr. Reid, who had been unwell for some months, came out from Dawson a few weeks ago and his death took place following an operation in a Toronto hospital, where he was undergoing treatment. Interment was made at Vancouver.

Mr. Percy Reid was born at Summerside, Prince Edward Island, on August 21, 1874, and was educated at the local elementary schools and Prince of Wales College, Charlottetown. He had early to enter upon the battle of life and began as a member of the crew of a fishing schooner. Determined to make his way, this occupation did not retain him long; he entered commercial pursuits and by 1897 was a salesman for a firm of law stationers in Toronto. This was the time of the Klondike gold rush, and in the early spring of 1898 he was one of the band of adventurous spirits who fought their way over the snows of White pass and descended in frail craft the death-dealing rapids leading to the upper waters of the Yukon. He spent one year in placer mining and in the spring of 1899 was appointed assistant mining inspector at Caribou on Dominion creek. Later he was made inspector at this station and held that post until 1904, when he became recorder of the Kluane Lake district in southwestern Yukon. In 1906 he was attached to the office at Whitehorse and later made recorder at Carcross where he remained for eight years.

In 1914 he became chief inspector of immigration which was a new post and one in which he did pioneer work for the Department, being sent to deal with difficult problems in China, as well as in countries of eastern Europe such as Poland and Hungary. Autumn 1924 found him back in Dawson as Gold Commissioner of the Yukon, which position he held up to the time of his death.

Mr. Reid was married on December 19, 1905, to Miss Gertrude Macpherson of Chatham, Ontario, who died on August 25, 1925. Surviving him are two sons, aged twenty and nineteen years, respectively.

Mr. Reid's predominating characteristic was his mastery of the details of all work pertaining to whatever office he held. The multifarious regulations, rulings, and decisions relating to mining in Yukon were at his fingers' ends, as were also those concerning immigration, when he was in that service; and his practice of dealing quickly and competently with questions presented to him conducted to the prompt despatch of Government business and gained him the high regard of his superior officers and of the general public.

Camels are commonly understood to belong exclusively to the Old World. It was not always so, however, as a specimen recently acquired by Canada's National Museum at Ottawa amply demonstrates. This is the fossilized frame of a camel which a few million years ago roamed over the western plains of North America which were then dry. This curious specimen has been placed on exhibition in the Hall of Palaeontology.

OUNDING THE UTMOST DEPTHS OF UNIVERSE

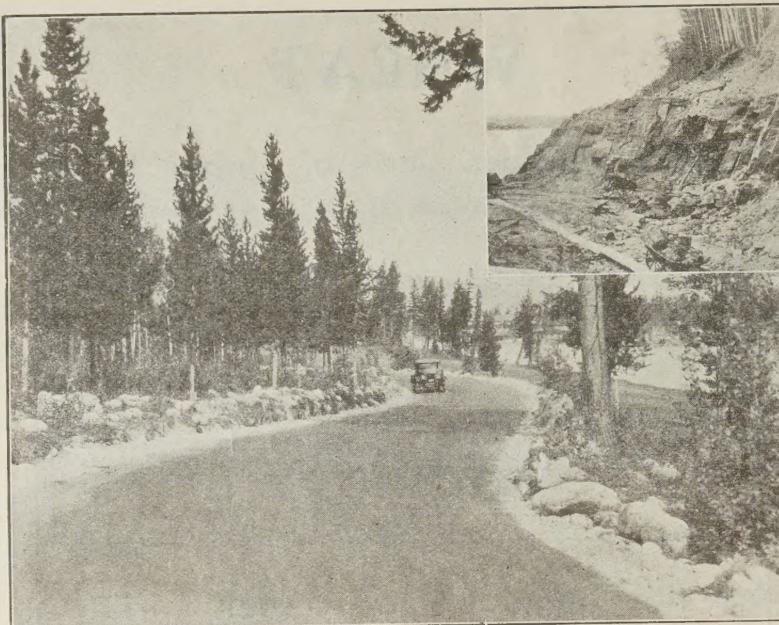
Dominion Observatory Co-operates in World-Wide Astronomical Effort—Its Practical Bearing

Although with each improvement in instruments and in methods the astronomer pushes farther into space and discovers more of the secrets of the universe, it must never be forgotten that the object of all these researches is to benefit the citizen in the field, the workshop, and the home. It was through the study of the sun, for example, that the immensely valuable element helium was discovered, and day by day astronomers are aiding chemists and physicists in the investigation of subjects of the greatest practical use to mankind. Since the stars afford means of studying matter under conditions of temperature and density which cannot be realized in the laboratory, it is of the utmost importance that the astronomer should continually extend his knowledge of our neighbors in space.

The most stupendous of all celestial objects is the Galaxy, more commonly known as the Milky Way. In fact it is our whole universe, of which the sun with all its attendant family of planets, including asteroids and satellites, as well as comets, forms a humble—a very humble—member. Its appearance as a dim white band crossing the heavens is merely a matter of perspective; that band marks simply the plane of greatest extension of the Milky Way—the direction in which the stars, in reality fairly uniformly distributed, appear congested by the effect of distance. Many of these stars are immensely brighter than the sun. Much has been heard in recent years of the red "giants" such as Betelgeuse, Antares, and Mira Ceti, many of them vastly distended bodies of hundreds of millions of miles in diameter, but with densities many times less than that of atmospheric air. A few of these super-giants expand and contract with the regularity of clock-work, and vary regularly in brightness during the process. To the astronomer they are known as Cepheids.

The problem offered by stars of this type has become one of the most important in astronomy. Already, by making use of a certain relationship between their brightness and their period of variability, a method has been developed of sounding the utmost depths of the universe, and outside galaxies—the spiral nebulae—have been recognized as entities entirely beyond the boundaries of our own galaxy, hitherto believed to comprise all visible objects. Their distances are such that light from them takes millions of years to reach the earth as compared to eight minutes from the sun. Although the Cepheids are such an important factor in determining distances their real nature is still in doubt. Progress in solving the problem can be made only by a careful study of the peculiarities of their variation in light and by the analysis of their spectra.

In the spring of 1920 at the Dominion Observatory, Ottawa, experiments were begun to ascertain whether small, short-focus lenses might not be used to determine accurately variations of brightness by photographic means. Results soon justified the hopes entertained and curves of variation of several Cepheids were determined and published. To



Pave Jasper Park Motor Road With Bituminous Sands—Section of the recently surfaced highway leading to Jasper Park Lodge. Lac Beauvert is seen to the right and the Lodge buildings may be discerned among the trees on the lake shore. Inset—The deposit on the banks of the Clearwater river in northern Alberta from which the paving material was secured.

PAVE JASPER PARK MOTOR ROAD WITH BITUMINOUS SANDS

(Continued from page 1)

and conveyed over a trestle to the railway siding, where it was dumped directly on the decks of the freight cars.

The heating and mixing of the sand for road surfacing presented no difficulty although the plant constructed and operated at Jasper represented a radical departure from generally accepted methods. Its outstanding features were the low cost of construction, simplicity of operations, and low operating costs.

The behaviour of the pavements laid in Jasper park and the success of several small test pieces put down in the city of Edmonton in 1915 make it clear that Alberta bituminous sand can be used for the construction of the highest class of asphalt wearing surfaces so that it will be the matter of cost which will determine the extent to which this paving material may be used in the West. It is, therefore, interesting to know that the costs of mining, shipping, and laying the pavements at Jasper compare favourably with those for which pavements of imported asphalt are laid in Edmonton and other cities in

obtain really significant data, however, it was necessary to plan continuous measurements of brightness, consecutive observations being separated by the shortest possible intervals, unhindered by daylight, moonlight, cloudiness, or poor conditions of the atmosphere. Clearly this was possible only through world-wide co-operation, by enlisting the goodwill and enthusiasm of scientific men everywhere in the endeavour. The initiative was taken by astronomers of the Dominion Observatory, who at the Cambridge meeting of the International Astronomical Union, organized an informal gathering of about twenty astronomers and laid the foundations of a world-wide organization. A definite scheme of work was outlined which has received the support of distinguished astronomers in many countries, and work has already been begun. So far some fifteen observatories are participating in the observations. It is hoped that in process of time the collection and discussion of the results may throw light on the nature of these interesting stars.

Alberta. Mining and shipping of the sand were carried out under great difficulties owing to the absence of adequate rail transportation, while the mixing plant was deficient in labour-saving equipment. It is therefore reasonable to assume that with more adequate transportation and a mechanically perfected mixing plant of larger capacity, costs can be materially reduced.

The work in Jasper park marks an epoch in the investigating of these sands which has been in progress for a number of years by the Department of Mines, under the direction of Mr. S. C. Ells. From what has been done it is realized that the bituminous sands constitute one of the great natural resources of Canada. The primary object of the investigation has been to render available such data as would enable capital to undertake development in the McMurray area with the minimum of preliminary expense and delay. The utilization of the deposits of bituminous sands would, it has been found, be possible in three ways: (1) as a surfacing material for city and country roads; (2) as a source of high grade, refined bitumen, which is admirably adapted for paving purposes, for the manufacture of paints and varnishes and for other allied uses; and, (3) as a potential source of liquid hydro-carbons including gasoline, kerosene, lubricating oils, and fuel oils.

The demonstration just completed in the first of these uses is particularly important since in other countries similar deposits have been used for many years as a source of satisfactory paving material, and some of the most used of these products carry not more than 7 per cent of bitumen (asphalt cement) whereas the McMurray sands contain from 12 to 18 per cent of bitumen. As much asphalt used in the Prairie Provinces is imported from other countries situated at a considerable distance it would appear that the local product should be able to compete with the imported article.

For the past twenty years the Cobalt silver area of Canada has been the main source of the world's supply of cobalt. In the period 1907-1926, both years included, the total output of cobalt was 21,843,764 pounds.

CANADA RANKS HIGH AS A FUR PRODUCER

Dominion's Wilderness Areas Form Chief Source of Our High Class Pelts

Canada is one of the foremost fur producers of the world. Raw furs are the chief commercial product of the wild life of the northern half of the continent and as such represent the only economic return from large areas in the Dominion. From these great natural preserves, or from farms on which fur bearers are raised in captivity, every province and territory of Canada contributes substantially to the total production. At the close of the fur year, June 30, 1926, the number of pelts taken was 3,686,148, valued at \$15,072,244.

Since the earliest times furs have played a prominent part in the economic life of the Dominion. They still continue to form a considerable item in the commerce of the country. In the last twenty years trade in furs has shown a marked increase on the North American continent and changes which have occurred, due to the war, have been commercially advantageous to Canada. The European fur centres of pre-war times no longer dominate, as strong competing fur markets have been established in recent years at Montreal, Winnipeg, Edmonton, and Vancouver, in Canada; and at New York in the United States. Millions of dollars worth of furs are handled annually at these auctions which attract buyers from all parts of the world. The value of Canada's trade in furs is shown by export and import figures supplied by the Dominion Bureau of Statistics. Fur exports have risen from \$5,668,000 in 1914 to \$20,608,687 in 1927, and imports increased from \$3,755,000 in the former year to \$13,365,124 in the latter. The value of furs manufactured in Canada in 1925, the latest year for which statistics are available, was \$14,142,863, an increase of 15 per cent over the preceding year. The number of fur skins treated in fur dressing establishments was 4,190,351.

The major part of Canada's annual catch is taken by trappers. Many thousands of persons are engaged for the whole or part of their time during the winter season in taking pelts of wild fur-bearers. The principal species trapped are beaver, fisher, fox, muskrat, mink, marten, lynx, raccoon, skunk, wolverine, wolf, and weasel. Fur farming, particularly the raising of silver foxes in captivity, is now carried on in all the provinces of the Dominion and in Yukon Territory, and the value of the output of pelts from these farms constituted in 1926 approximately five per cent of the total value of raw fur production in Canada. Although the fox has proved most suited to domestication, other kinds of fur-bearing animals are being raised in captivity, namely, mink, raccoon, skunk, marten, fisher, coyote, beaver, and muskrat. Karakul sheep and chinchilla rabbits are also raised successfully in Canada.

The Dominion, with its cold, dry winter season is productive of the very finest furs. In the vast wilderness areas of Canada lies the last great reservoir of wild life which is the main source of our raw furs and by conservation and development the products of these areas will long play an important part in the economic life of the Dominion.



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